

## **Appendix A**

### **Monitoring Well and Borehole Completion Data**

**Appendix A. GSA monitoring well and borehole completion data.**

Well/Borehole	Well/Borehole Depth	Screened Interval(s)	Screened Zone(s)	Geophysical Log(s) Recorded
C403-1	77	NA	NA	--
C403-2	51	NA	NA	--
C403-3	42	NA	NA	--
C403-4	42	NA	NA	--
C403-5	36.2	NA	NA	--
C403-7	51	NA	NA	--
C403-8	51	NA	NA	--
C403-9	51	NA	NA	--
C403-10	76	NA	NA	--
GEW-710	158	94-137	USZ and LSZ	GR, R
GEW-711	167.5	94-137	USZ and LSZ	--
GEW-808*	150	50-140	USZ and LSZ	--
GEW-816*	161.8	50-140	USZ and LSZ	--
GIW-813*	140.7	67-87 107-127	USZ and LSZ	--
GIW-814*	149.6	86.5-106.5 110-120	USZ and LSZ	--
GIW-815*	143	77-97 112.5-132.5	USZ and LSZ	--
GIW-817**	150	NA	NA	--
GIW-818*	150	82-102 120-140	USZ and LSZ	--
GIW-819*	150	78.6-98.6 108-118	USZ and LSZ	--
GIW-820*	143.3	85-105 112-132	USZ and LSZ	--
GSB-1	96	NA	NA	--
GSB-2	97	NA	NA	--
GSB-3	97	NA	NA	--
GSB-4	96	NA	NA	--
GSB-6	106	NA	NA	--
GSB-14	141	NA	NA	--
GSB-801*	143.9	NA	NA	I
GSB-802*	148	NA	NA	I
GSB-803*	150	NA	NA	--
GSB-804*	145.5	NA	NA	--
GSB-805*	150	NA	NA	--
GSB-806*	140	NA	NA	I
GSB-807*	150.5	NA	NA	--
GSB-809*	132.5	NA	NA	I
GSB-810*	142.3	NA	NA	I

**Appendix A. GSA monitoring well and borehole completion data. (Continued).**

Well/Borehole	Well/Borehole Depth	Screened Interval(s)	Screened Zone(s)	Geophysical Log(s) Recorded
GSB-811*	140.1	NA	NA	--
GSB-SNL-001*	131	118-131	LSZ	--
GSW-1A	208.5	115-130	LSZ	GR, R
GSW-2	113	87-107	USZ	GR, R
GSW-3	115	85-105	USZ	GR, R
GSW-4	112	86-106	USZ	GR, R
GSW-5	110	94-104	USZ	GR, R
GSW-6	212	121-137	LSZ	GR, R
GSW-7	176.6	111-124	LCL	GR, R
GSW-8	176.3	127.5-132.5	LSZ	GR, R
GSW-9	197.2	147-153	LSZ	GR, R
GSW-10	205.5	114-128	LSZ	GR, R
GSW-11	182.5	115-126	LSZ	GR, R
GSW-12	205	186.5-191	Below LSZ	GR, R
GSW-13	198	125-134.5	LSZ	GR, R
GSW-15	148	20.5-28 38-44 50-56 60-64 68-73 77-83 95-105 120-130	Above USZ, USZ and LSZ	GR, R
GSW-16	146	23-28 38-43 50-55 61-66 78-83 95-105 120-130	Above USZ, USZ and LSZ	--
GSW-208	211	108-118	LSZ	GR, R
GSW-209	204	113-133	LSZ	GR, R
GSW-215	213.5	127-134	LSZ	GR, R
GSW-216	120.5	111-121	LSZ	GR, R
GSW-403-6	138	90-110	USZ and LSZ	GR, R
GSW-445	319	155-161	Below LSZ	GR, R
HW-GP-001*	120	67-77	Above USZ	--
HW-GP-002*	120	68-78 107-117	Above USZ and LCL	--
HW-GP-003*	119	109-119	LCL	--
MW-20	134	95-105	USZ	--
MW-508	316	287-305	Below LSZ	GR, R
SVB-GP-001*	20	--	NA	--
SVB-GP-002*	21	--	NA	--
SVB-GP-004*	21	--	NA	--

**Appendix A. GSA monitoring well and borehole completion data. (Continued).**

Well/Borehole	Well/Borehole Depth	Screened Interval(s)	Screened Zone(s)	Geophysical Log(s) Recorded
SVB-GP-006*	20	--	NA	--
SVB-GP-008A*	90	--	NA	--
SVB-GP-009*	20.3	--	NA	--
SVB-GP-010*	20	--	NA	--
SVB-GP-012*	51	--	NA	--
SVB-GP-013*	89	--	NA	--
SVB-GP-014*	90	--	NA	--
TEP-GP-001*	165	88-97 107-117	USZ and LSZ	I
TEP-GP-002*	161.4	102-112.5 122-133	USZ and LSZ	--
TEP-GP-003*	161.1	124.5-129.5	LSZ	--
TEP-GP-004*	161	96-106 124-134	USZ and LSZ	I
TEP-GP-005*	161	114.5-124.5	LSZ	I
TEP-GP-006*	161	107-127	LSZ	I
TEP-GP-007*	161	115.5-125.5	LSZ	--
TEP-GP-008*	161	100-110 119-129	USZ and LSZ	--
TEP-GP-009*	161.8	98-107 120.5-130.5	USZ and LSZ	I
TEP-GP-010*	161	114.5-124.5	LSZ	--
TEP-SNL-011*	161	98-108	USZ	--

USZ = Upper Steam Zone (approximately 80 to 110ft bgs)

LSZ = Lower Steam Zone (approximately 120 to 135 ft bgs)

CL = Confining layer between USZ and LSZ (approximately 110 to 120 ft bgs)

I = Induction log

GR = Gamma ray log

R = Electrical resistivity log

NA = Not applicable

-- = Data not available

\* = DUSDP boreholes and wells

\*\* = Faulty completion, well abandoned

HW = Gasoline Spill Area electrical resistance heating well

GIW = Gasoline Spill Area injection well and electrical resistance heating well

GEW = Gasoline Spill Area extraction well

TEP = Gasoline Spill Area imaging/temperature well

## **Appendix B**

### **GSA Hydrostratigraphic Units**

## Appendix B

### GSA Hydrostratigraphic Intervals

Seven hydrostratigraphic intervals have been defined at the GSA on the basis of core descriptions, geophysical log response, and hydraulic data. These hydrostratigraphic intervals consist of the hydrogeologic units discussed in the "Pre-Dynamic Stripping Underground Demonstration Project Hydrogeochemical Characterization of the Gasoline Spill Area" and shown on hydrogeologic cross-section B-B' (Figure 3). The seven sedimentary sequences were deposited in an alluvial fan setting in response to climatic and/or tectonic changes, and may significantly influence steam migration. These seven hydrostratigraphic units are, from surface downward:

- 1) The uppermost unit, Unit 1, consists of 5 to 15 ft of higher-permeability sandy gravel and gravelly sand from 5 to 20 ft below ground surface (bgs) which occur across the entire GSA. Unit 1 is generally overlain by 5 to 10 ft of finer-grained, clayey silt to silty clay. Unit 1 is interpreted as braided-stream deposit and appears to thin northward.
- 2) Unit 2 consists of about 30 ft of laterally continuous, lower-permeability clayey silt to silty clay, extending from 20 to 50 ft bgs interpreted as overbank deposits. Generally thin, laterally discontinuous lenses of higher-permeability alluvial channel deposits occur throughout Unit 2, becoming more laterally continuous to the west and southwest of the GSA. Unit 2 therefore is a thick aquitard, or steam barrier, which separates the steam zones from the surface. Unit 2 sediments appear to have been deposited at the distal margin of an alluvial fan lobe or in a low energy inter-fan lobe area where the deposition of fine-grained overbank deposits predominated.
- 3) Unit 3 consists of a very heterogeneous zone of elongate lenses of channel sand and gravel interbedded with silty clay and clayey silt. Unit 3 extends from approximately 50 ft to 80 ft bgs. The lenses of higher-permeability sediments in Unit 3 are more laterally continuous than in Unit 2 and are often vertically connected; i.e., overlying channel deposits downcut or incise into underlying channel deposits, thereby forming vertical migration pathways for the upward movement of steam. Unit 3 sediments are interpreted to have been deposited close to the axis of an alluvial fan lobe, where braided channel deposition predominated. The lower portion of Unit 3 constitutes the aquitard which overlies the USZ.
- 4) Unit 4 is the USZ, a partially saturated zone composed of a heterogeneous mixture of high to lower permeability sandy to clayey gravel and gravelly to silty sand, 80 ft to 110 ft bgs. These sediments are interpreted as braided stream and debris flow deposits. Although the USZ consists largely of single, discrete interval of channel deposits which wedges out to the southwest, northeast, and probably north of the GSA, this interval has been incised in several places by an overlying channel deposit sequence composed of hydrogeologic unit 3 sediments. As a result,

the USZ extends upward into the vadose zone 10 to 30 feet. The structural configuration, geometry, and hydraulic properties of the USZ are discussed in the main body of Section 2.

5) Unit 5 is composed of low-permeability silty clay and clayey silt. The unit, which forms an aquitard between the USZ and LSZ, also contains discontinuous lenses of higher-permeability sediments defined as the second water-bearing zone in Dresen *et al.* (1986). Unit 5 occurs between about 110 and 120 ft bgs. Although borehole data indicate that the aquitard thins to less than 5 feet in places, hydraulic testing indicate that there is no hydraulic communication between the USZ and LSZ. The aforementioned second water-bearing zone appears to become more laterally continuous to the southwest. The geometry, structure, and integrity of the unit 5 aquitard are discussed the main body of Section 2.

6) Unit 6, which consists of high-permeability, laterally continuous gravelly sand and sandy gravel, constitutes the third water-bearing zone (Dresen *et al.*, 1986) and is referred to herein as the LSZ. The LSZ occurs between about 120 to 135 ft b.g.s. and averages 11 ft in thickness. LSZ sediments appear to have been deposited as braided stream channel deposits which form a sheet-like deposit exhibiting a high degree of hydraulic homogeneity. The details of the structure, geometry, and hydrogeology of the LSZ are presented in the main body of Section 2.

7) Underlying the LSZ are laterally continuous silty clay to clayey silt extending a minimum of 15 feet below the base of the LSZ. In the southwest portion of the GSA, a laterally continuous, poorly-sorted, lower-permeability gravelly clay deposit occurs immediately below the LSZ (Fig. 19). These sediments, interpreted as a debris flow, occur within the finer-grained silty clay and clayey silt overbank deposits which constitute most of Unit 7. Unit 7 is a low permeability barrier that should inhibit migration of steam below the LSZ.



## **Appendix C**

### **Sampling Plan for Dynamic Underground Stripping Activities**

## **Appendix C-1**

### **Sampling Plan for Characterization Project at Gasoline Spill Area Following Dynamic Underground Stripping Activities Dorothy Bishop, (510) 422-2267 Jennifer Nelson-Lee, (510) 422-5750**

#### **1. Sampling Team**

Jennifer Nelson-Lee will coordinate the sampling effort during drilling as part of the post characterization phase of the gasoline spill cleanup (TFF site) near Building 406 (Figure 1). The following people will support the sampling effort as needed: Bunsen Nie, Sanjay Gangadhara, Monique Jennings, Rex Caufield, Jim Loftis, Dorothy Bishop, Maureen Ridley, Marina Jovanovich, Paula Krauter, Roger Martinelli, Kin Chao, Mike Dibley, Gene Kumamoto, and Tristan Pico.

#### **2. Safety Issues**

All people working with Jennifer during the drilling and sampling activities at the Gas Pad, must have their SARA/OSHA 40-hour training and the SARA/OSHA 8-hour refresher course where necessary. These people must also be respirator fitted, and wear appropriate safety shoes, glasses, hardhats, Tyvek suits, and heat insulated gloves while sampling. They should also be current in the following training courses: HS-4050 and EP-0006 as per OSP 406.2. Additional safety training will be provided by Bob Bainer and/or Jerry Duarte on pertinent safety measures and the use of the OVA/OVM.

#### **3. Sample Collection and Storage**

Continuous coring and lithological logging will take place in all characterization boreholes using the hollow stem auger drilling method. However, samples for physical, chemical, and biological analyses will be taken using a split spoon sampler lined with steam cleaned brass tubes. Additional biology, chemistry, and "Extra" samples will also be taken from the continuous core by driving brass liners into the side of the core using a special teflon adapter and hammer. "Extra" samples will be collected: (1) as described in Appendix A., (2) at depths where there are OVA/OVM readings  $\geq 10$  ppm, and (3) at significant lithologic changes. All temperature and depth measurements, and details related to sample identification must be recorded in a field logbook during the drilling and sampling operations. **The field logbook is located and will be kept in Building 406 when it is not in use at the drilling site.** Monitoring with the OVA/OVM will be done continuously as core is extracted. All readings on the OVA/OVM will be recorded in the field notebook. Some cores are expected to reach temperatures of approximately 100°C due to the introduction of steam and electrical heating in the subsurface. Hence caution must be exercised when handling the hot cores. Details of the sample storage and collection processes are described below and are shown in Appendix A.

#### **Temperature**

- Temperature readings will be taken in the center of the continuous core, whenever core is extracted from the borehole, and before and after every split spoon sample is taken. Both the temperature and the depth at which that temperature is taken must be recorded in the field logbook.

#### **Biology**

- Biology samples will be collected as described in Appendix A-2. All biology samples will be placed in 1.5" X 3"-autoclaved brass liners when collected from the continuous core, and in 2.5" X 3"-autoclaved brass liners when the split spoon sampler is used. All such samples will be stored in a styrofoam container (**with NO ICE**). Questions pertaining to biology samples should be directed to Paula Krauter (423-1198).

#### **Chemistry**

- Chemistry samples will be collected as described in Appendix A-3. Three chemistry samples will be collected (three for DBCH) at a depth of 40ft in each borehole where the temperature is relatively cool. Two chemistry samples (one CLS , one DBCH ) will be collected every 5ft from a depth of 75ft - 130ft as per Appendices A-6 and A-7. An additional chemistry sample (for BTDC) will be collected every 10ft from 75ft - 125ft as shown in Appendices A-6 and A-7. **All**

**OVA/OVM readings must be recorded in the field logbook at the depth noted.** Any positive OVA/OVM readings observed within a foot of where chemistry samples are taken are to be recorded in the "Remarks" column on the Chain-of-Custody forms for the chemistry (CLS, DBCH, and BTDC) samples. Teflon liners and caps should be quickly placed on all chemistry samples and put into appropriately labeled aluminum pouches (made from aluminum foil), placed in a container and **surrounded with dry ice**. All BTDC samples will be spiked with a surrogate in the field. Any questions pertaining to the chemistry samples should be directed to Marina Jovanovich (422-2144, 422-6029).

#### **Physical**

- Samples for physical analyses will be collected as described in Appendix A-4. For all proposed boreholes: One sample is to be collected every 5ft from 75ft - 130ft as per Appendices A-6 and A-7. All samples except permeability (K) samples are to be stored in plastic bags after cooling and placed in a container on **dry ice**. Permeability (K) samples are to be placed in plastic bags after cooling and stored on **wet ice**. Questions concerning samples collected for physical analyses (labeled "Kd") or "Extra" should be directed to Jennifer Nelson-Lee (422-5750).

#### **4. Samples for On-Site Distribution**

Samples for on-site distribution will go to one of three laboratories associated with the Environmental Restoration Division: Chemistry Lab, Soils Lab, and Biology Lab. Samples labeled "DBCH" and "BTDC" will be entered as "RUSH" turnaround on the COC and delivered to the Chemistry Lab located in B-362. Samples labeled "Kd" and "Extra" will be sent to the Soils Lab located in B-377 while "BIO" samples will be delivered to the Biology Lab also located in B-377. **A separate Chain-of-Custody form must be filled out for each laboratory and also for each Document Control Number.** For example, "DBCH" samples recorded on page 26 of the logbook labeled "GN" would have a document control number of GN-026 and would need one COC. However, "DBCH" samples recorded on page 27 of the same logbook during the same day would need a new COC since the related document control number would be GN-027.

#### **5. Samples for Off-Site Distribution**

Samples labeled CLS are to be placed in a styrofoam container and surrounded by dry ice, taped and labeled. All samples sent to CLS will be submitted for "RUSH" turnaround and the results faxed to Marina Jovanovich. These samples must be left with the accompanying Chain-of-Custody forms for the CLS courier to pick up. CLS soil samples which are not composite drum samples are to be analyzed for 8020, and 8015M. The six brass tubes containing borehole cuttings from the waste drums comprise one composite "drum" sample. These six brass tubes are also sent to CLS for analyses as described in TFF Soil Sampling for Off-Site Disposal. **The CLS courier picks up the samples from a lock box located between B-531 and T-5399 on Third Street (between T-4383 and T-5425).** For questions regarding CLS pick up, please check with Maureen Ridley (422-3593) or Gene Kumamoto (422-8128).

Samples labeled K (permeability) are to be placed in a styrofoam container and surrounded by **wet ice**, taped, labeled and left with the accompanying Chain-of-Custody forms for courier pick up to Woodward-Clyde, Inc. In lieu of courier pick up for samples labeled K, these samples may be left at the on-site Soils Lab where they will be refrigerated until delivery to Woodward-Clyde. Tom Dresser (424-5350) is presently checking on courier pick up.

Samples for off-site distribution should be stored and distributed as described in Appendix A-8.

#### **6. TFF Soil Sampling for Off-Site Disposal**

COC's that pertain to the composite samples should be labeled for the following analyses;

##### **ANALYSIS REQUIRED:**

- 1.) TTL
- 2.) STLC
- 3.) STLC (distilled water method)
- 4.) 8010 (Halogenated Volatile Organics)
- 5.) 8020 (Aromatic Volatile Organics)
- 6.) 8015M (TPH - Gasoline)

### **7. Disposal of Borehole Cuttings**

One composite sample per analysis will be collected for every six-55 gal. drums of borehole cuttings extracted. Hence a total of **six brass tubes** will be collected per six-55 gal. drums of cuttings.

All six drums will have the same composite sample I.D. # on each label.

All analyses to be performed on composite samples should be submitted on "rush" turnaround.

Copies of the COC must be sent with the drums to B-597 WAA. Questions about disposal of cuttings should be forwarded to P.J. Lyra (422-1830).

### **Explanation of Acronyms used:**

SARA/OSHA	Superfund Amendments (to CERCLA) Reauthorization Act of 1986/Occupational Safety and Health Administration
OVA/OVM	Organic Vapor Analyzer/Organic Vapor Meter
DBCH	Dorothy Bishop - Chemistry Lab
CLS	California Laboratory Services
BTDC	Bulk Thermal Desorption Chamber
COC	Chain-of-Custody
K	Permeability
Kd	Partition Distribution Coefficient
WAA	Waste Accumulation Area
TTLCLC	Total Threshold Limit Concentration
STLC	Solubility Threshold Limit Concentration
B-531	Building 531
T-5399	Trailer 5399
TFF	Treatment Facility F
BTEX	Benzene, Toluene, Ethyl-Benzene, and Xylene
TPH	Total Petroleum Hydrocarbons

**Appendix C-2. Sample frequency for biology samples.**

Borehole ID #	Sampling Depth	Sampling Frequency	# of Samples Collected
TEP-GP-101		no biology samples collected	0
HW-GP-102	40 ft - 70 ft 75 ft - 130 ft	2 samples every 10 ft 2 samples every 5 ft	8 24
HW-GP-103	40 ft - 70 ft 75 ft - 130 ft	1 samples every 10 ft 1 sample every 5 ft	4 12
HW-GP-104	0 ft - 130 ft	2 samples every 5 ft	54
HW-GP-105	40 ft - 70 ft 75 ft - 130 ft	1 samples every 10 ft 1 samples every 5 ft	4 12
TEP-GP-106	40 ft - 70 ft 75 ft - 130 ft	1 samples every 10 ft 1 samples every 5 ft	4 12

**Appendix C-3. Sample frequency for chemistry samples.**

Borehole ID #	Sampling Depth	Sampling Frequency	# of Samples Collected
TEP-GP-101	40 ft	3 (BTDC) continuous core samples	3
	75 ft - 125 ft	3 split spoon samples every 10 ft	18
	80 ft - 130 ft	2 split spoon samples every 10 ft (where no BTDC samples taken)	12
HW-GP-102	40 ft	3 (BTDC) continuous core samples	3
	75 ft - 125 ft	3 split spoon samples every 10 ft	18
	80 ft - 130 ft	2 split spoon samples every 10 ft (where no BTDC samples taken)	12
HW-GP-103	40 ft	3 (BTDC) continuous core samples	3
	75 ft - 125 ft	3 split spoon samples every 10 ft	18
	80 ft - 130 ft	2 split spoon samples every 10 ft (where no BTDC samples taken)	12
HW-GP-104	40 ft	3 (BTDC) continuous core samples	3
	75 ft - 125 ft	3 split spoon samples every 10 ft	18
	80 ft - 130 ft	2 split spoon samples every 10 ft (where no BTDC samples taken)	12
HW-GP-105	40 ft	3 (BTDC) continuous core samples	3
	75 ft - 125 ft	3 split spoon samples every 10 ft	18
	80 ft - 130 ft	2 split spoon samples every 10 ft (where no BTDC samples taken)	12
TEP-GP-106	40 ft	3 (BTDC) continuous core samples	3
	75 ft - 125 ft	3 split spoon samples every 10 ft	18
	80 ft - 130 ft	2 split spoon samples every 10 ft (where no BTDC samples taken)	12

**Appendix C-4. Sample frequency for physical analyses.**

Borehole ID #	Sampling Depth	Sampling Frequency	# of Samples Collected
TEP-GP-101	40 ft - 70 ft	1 (EXTRA)continuous core sample per 10 ft	4
	75 ft - 125 ft	1 (Kd) split spoon sample per 5 ft	11
	80 ft - 130 ft	1 (EXTRA) split spoon sample per 10 ft (where no BTDC samples taken)	6
HW-GP-102	40 ft - 70 ft	1 (EXTRA)continuous core sample per 10 ft	4
	75 ft - 125 ft	1 (Kd) split spoon sample per 5 ft	11
	80 ft - 130 ft	1 (EXTRA) split spoon sample per 10 ft (where no BTDC samples taken)	6
HW-GP-103	40 ft - 70 ft	1 (EXTRA)continuous core sample per 10 ft	4
	75 ft - 125 ft	1 (Kd) split spoon sample per 5 ft	11
	80 ft - 130 ft	1 (EXTRA) split spoon sample per 10 ft (where no BTDC samples taken)	6
HW-GP-104	40 ft - 70 ft	1 (EXTRA)continuous core sample per 10 ft	4
	75 ft - 125 ft	1 (Kd) split spoon sample per 5 ft	11
	80 ft - 130 ft	1 (EXTRA) split spoon sample per 10 ft (where no BTDC samples taken)	6
HW-GP-105	40 ft - 70 ft	1 (EXTRA)continuous core sample per 10 ft	4
	75 ft - 125 ft	1 (Kd) split spoon sample per 5 ft	11
	80 ft - 130 ft	1 (EXTRA) split spoon sample per 10 ft (where no BTDC samples taken)	6
TEP-GP-106	40 ft - 70 ft	1 (EXTRA)continuous core sample per 10 ft	4
	75 ft - 125 ft	1 (Kd) split spoon sample per 5 ft	11
	80 ft - 130 ft	1 (EXTRA) split spoon sample per 10 ft (where no BTDC samples taken)	6

**Appendix C-5. Borehole sample sequence.**

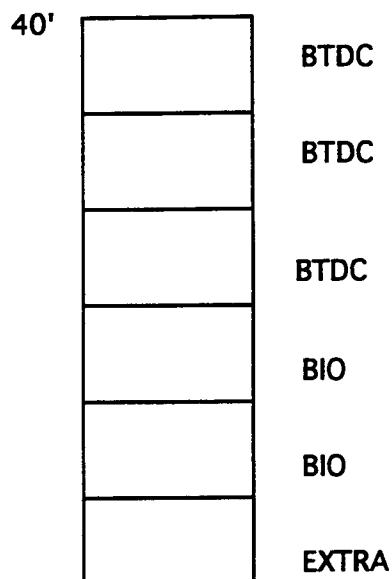
Depth	Samples						Total # of Samples
0-30 ft	?	?	?	?	?	?	?
40 ft	(3) BTDC	(2) BIO	(1) EXTRA				6
50 ft	(2) BIO	(1) EXTRA					3
60 ft	(2) BIO	(1) EXTRA					3
70 ft	(2) BIO	(1) EXTRA					3
75 ft	(1) BIO	(1) K	(1) DBCH	(1) CLS	(1) BTDC	(1) Kd	6
80 ft	(1) BIO	(1) K	(1) DBCH	(1) CLS	(1) EXTRA	(1) Kd	6
85 ft	(1) BIO	(1) K	(1) DBCH	(1) CLS	(1) BTDC	(1) Kd	6
90 ft	(1) BIO	(1) K	(1) DBCH	(1) CLS	(1) EXTRA	(1) Kd	6
95 ft	(1) BIO	(1) K	(1) DBCH	(1) CLS	(1) BTDC	(1) Kd	6
100 ft	(1) BIO	(1) K	(1) DBCH	(1) CLS	(1) EXTRA	(1) Kd	6
105 ft	(1) BIO	(1) K	(1) DBCH	(1) CLS	(1) BTDC	(1) Kd	6
110 ft	(1) BIO	(1) K	(1) DBCH	(1) CLS	(1) EXTRA	(1) Kd	6
115 ft	(1) BIO	(1) K	(1) DBCH	(1) CLS	(1) BTDC	(1) Kd	6
120 ft	(1) BIO	(1) K	(1) DBCH	(1) CLS	(1) EXTRA	(1) Kd	6
125 ft	(1) BIO	(1) K	(1) DBCH	(1) CLS	(1) BTDC	(1) Kd	6
130 ft	(1) BIO	(1) K	(1) DBCH	(1) CLS	(1) EXTRA	(1) Kd	6
<b>Total # of samples taken</b>							<b>153</b>

Note: The number in parenthesis preceding an analysis indicates the number of samples to be taken at that depth for that analysis

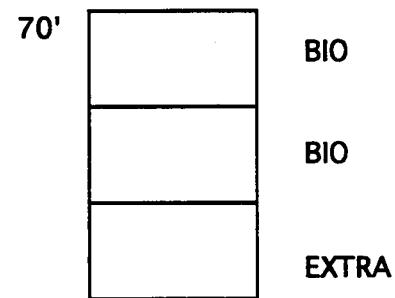
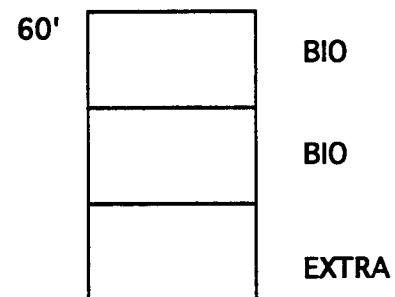
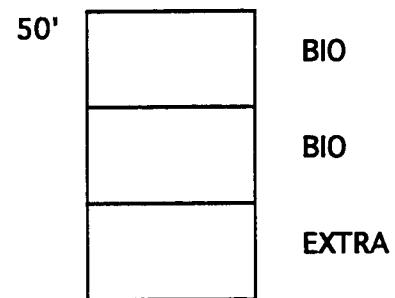
"EXTRA" samples taken at depths where OVA/OVM readings are greater than or equal to 10 ppm

**Appendix C-6. Sampling sequence for sample collection from continuous cores from 40ft - 70ft.**

**Sampling Sequence  
at 40 ft.**



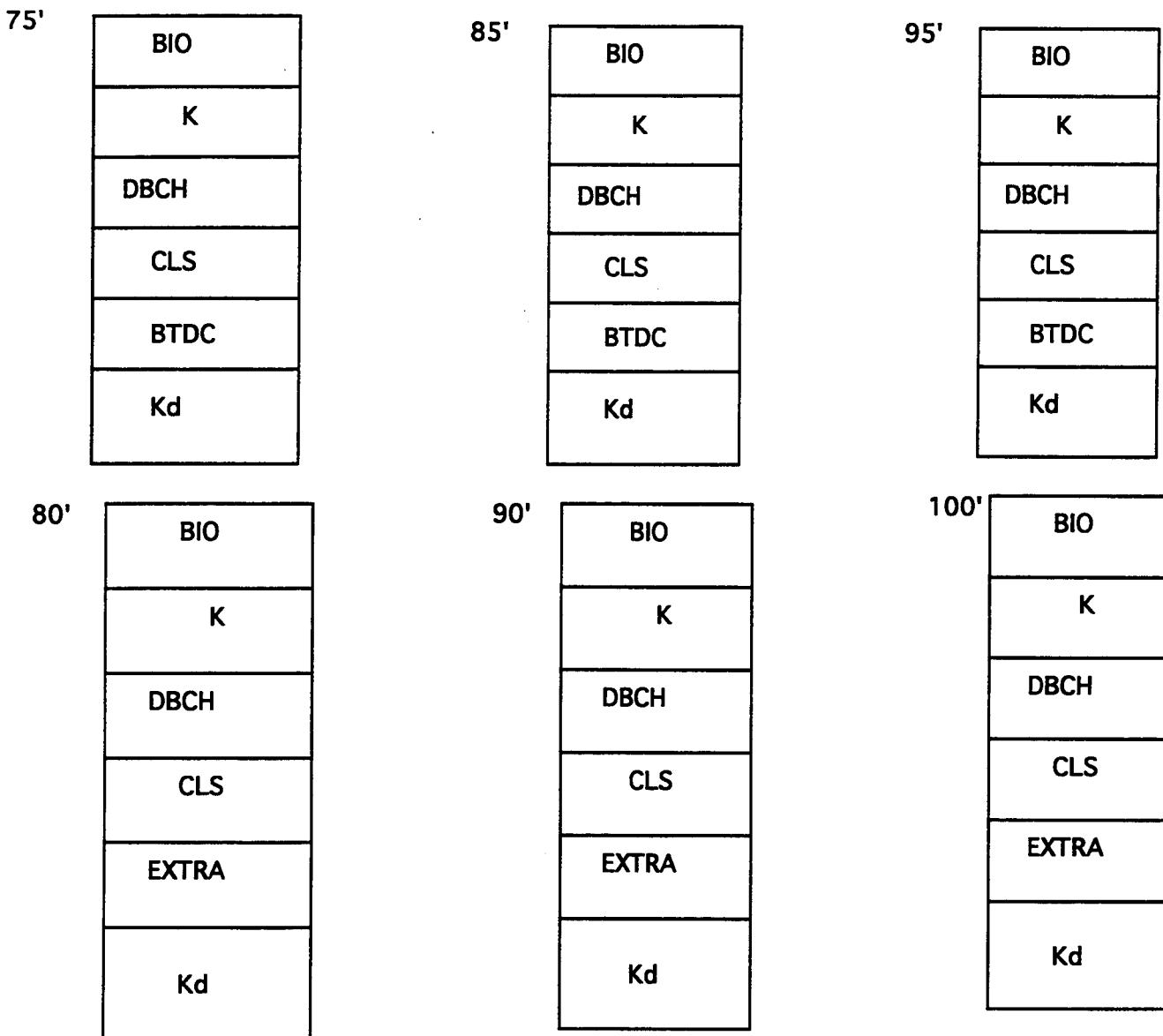
**Sampling Sequence  
at 50ft, 60ft, 70ft**



**\*Repeat this sampling sequence for every borehole from 40ft-70ft**

**Appendix C-7. Sampling sequence for sample collection from split spoon sampler from 75' - 100'.**

**SPLIT SPOON SAMPLER (3" X 18"), 6 - 2.5" X 3" BRASS CORES**

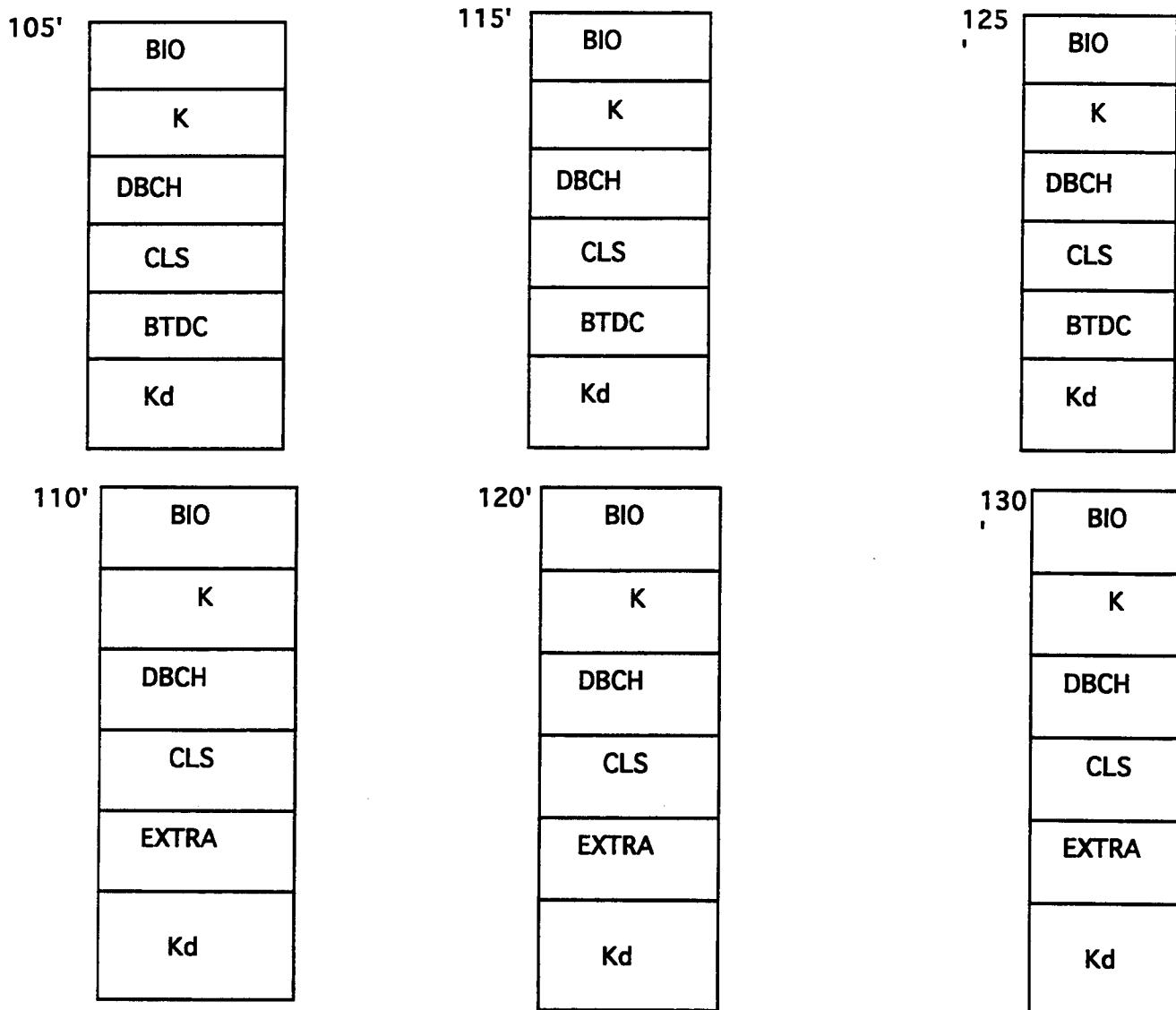


N.B.:

1. If good core recovery, try to collect 1 DBCH and 1CLS sample from continuous core after every split spoon sample from 90'-120'.
2. If limited core recovery, try to collect samples in the following order of priority: 1DBCH, 1CLS, 1BTDC, 1Kd, 1Bio.

**Appendix C-8. Sampling sequence for sample collection from split spoon sampler from 105' - 130'.**

**SPLIT SPOON SAMPLER (3" X 18"), 6 - 2.5" X 3" BRASS CORES**



**N.B.:**

1. If good core recovery, try to collect 1 DBCH and 1 CLS sample from continuous core after every split spoon sample from 90'-120'.
2. If limited core recovery, try to collect samples in the following order of priority: 1DBCH, 1CLS, 1BTDC, 1Kd, 1Bio.

## **Appendix C-9. Sample distribution and storage.**

**NO ICE**

**BIO (B377)**

**Return  
samples  
to B377**

**WET ICE**

**K (Woodward-Clyde)**

**DRY ICE**

**CLS (California Lab Services)**

**\*Leave samples  
for pickup by  
appropriate  
courier  
services**

**DRY ICE**

**DBCH (B362)**

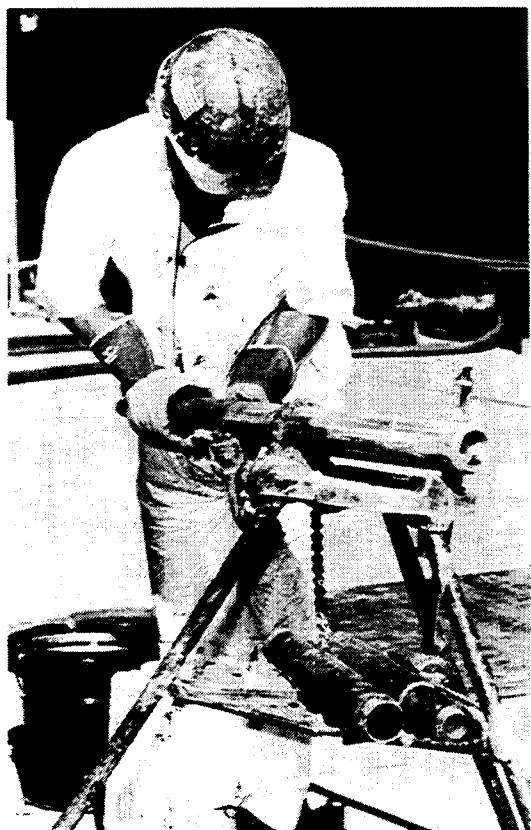
**BTDC (B362)**

**EXTRA (B377)**

**Kd (B377)**

**Samples for  
on-site  
analytical labs**

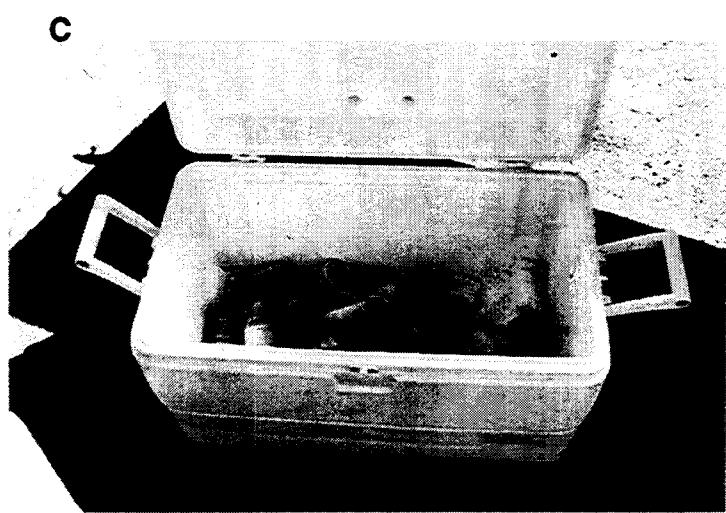
**\*Samples for off-site distribution must be delivered first. Courier pick up is from 4:00 pm - 4:30 pm and is located between B531 and T5399 on Third Street (between T4383 and T5425).**



A

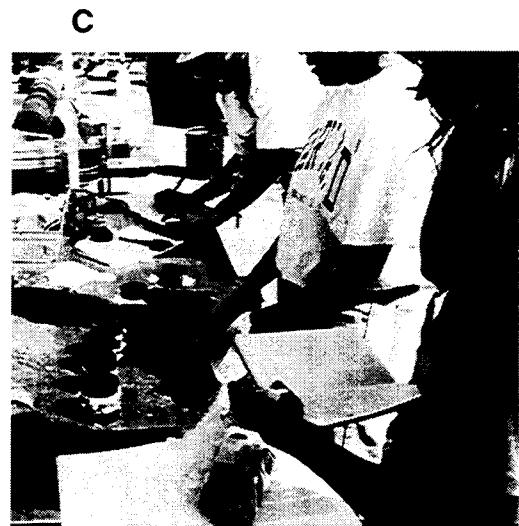
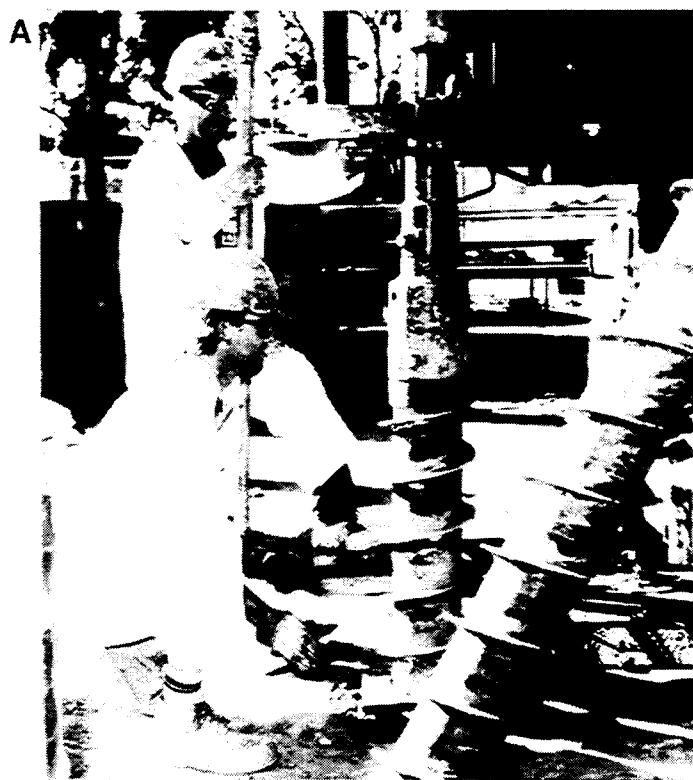


B



C

**Appendix C-10. Activities associated with split spoon sampling:** (A) split spoon sampler mounted for dismantling; (B) soil samples in brass liners as they are separated; (C) soil samples selected for chemical analyses and stored in cooler with dry ice.



**Appendix C-11. Activities associated with continuous core sampling:** (A) drill stem used to extract 6" diameter cores; (B) sampling team at work labeling and recording field data; (C) soil samples arranged for distribution and storage.

## **Appendix D**

### **OVA/OVM Readings and Core Temperature Data**

**Appendix D. OVM readings/temperature for (6) GP boreholes.**

Borehole ID: HW-GP-102			Borehole ID: HW-GP-103			Borehole ID: GSB-910		
Depth (ft)	OVM Reading (ppm)	Temperature (°C)	Depth (ft)	OVM Reading (ppm)	Temperature (°C)	Depth (ft)	OVM Reading (ppm)	Temperature (°C)
2.5-26.0	0.0		25.6	*0.0	21	18.1	1.0	24
26.0	0.0	22	28.0	119				22
29.0	0.0	20	29.0		22	21.3	1.0	
30.0	0.0	20	30.6	>240		25.0	0.6	22
32.0	0.0	21	32.6	123		31.6	1.0	27
35.0		24	34.0		22	34.0		27
36.0		22	34.6	100		39.0	1.0	22
37.0	0.0	21	35.7	*0.0	22	41.7	0.0	22
38.8		20	35.0	148		45.4	0.0	22
41.0	0.0		37.2	147		48.6	0.0	23
42.5	0.0	23	40.1	*0.0	24	51.7	0.0	26
48.5	0.0	23	38.7	150		54.6	0.0	26
49.5	0.0	21	40.7	156		59.0	0.0	32
51.8	0.0	24	41.5	*0.0	24	65.1	0.0	34
54.0	0.0	24	40.9	159		68.0	0.0	37
57.6	0.0	26	42.9	200		72.0	0.0	37
59.0	0.0	29	43.4	26		83.0	0.6	75
62.5	3.0	27	44.7	*0.0	28	89.0		64
64.7	1.7	28	46.6		28	94.0	2.2	66
66.3	0.0	30	47.0	25		99.0		59
69.0	*0.0	32	50.0		32	103.0	3.7	50
73.1	*0.0	39	50.8	102		116.2		37
76.3		40	52.5	13		125.0		26
79.7	>200	50	53.2		36	129.0	6.0	29
84.4	>250	54	55.2		36			
86.5	7.5	67	55.6	5.8				
89.5	34.0	78	58.3		38			
92.1		78	59.0	3				
93.3	183.0		61.8	11.8				
94.1	50.0	84	62.3		46			
98.6	3.0	80	64.4	49				
102.3	1.7	86	65.4		50			
104.5	1.7	97	67.6		52			
109.0	0.0	96	68.5	111				
111.3		86	71.2	237				
114.3	12.0	91	72.8		60			
117.3	*0.0	88	74.0	200				

**Appendix D. OVM readings/temperature for (6) GP boreholes. (Continued).**

Borehole ID: HW-GP-102			Borehole ID: HW-GP-103			Borehole ID: GSB-910		
Depth (ft)	OVM Reading (ppm)	Temperature (°C)	Depth (ft)	OVM Reading (ppm)	Temperature (°C)	Depth (ft)	OVM Reading (ppm)	Temperature (°C)
119.0	*0.0	92	78.0		63			
121.0	*0.0	89	77.6	175				
127.0		70	82.5	3	68			
130.0	138.0	58	85.5		68			
			87.0	1				
<b>*readings apply to breathing zone</b>			89.0		78			
			89.3	1				
			92.6		81			
			93.0	10				
			95.3	212				
			95.4		76			
			100.3	3.9				
			100.5		69			
			102.8		72			
			102.2	33				
			103.8	74				
			104.8	72				
			107.8	159				
			109.0		71			
			115.3	324				
			115.4		72			
			125.0		67			
			126.0	24				
			128.5		67			
			128.8	71				

**Appendix D. OVM readings/temperature for (6) GP boreholes. (Continued).**

Borehole ID: HW-GP-104			Borehole ID: TEP-GP-105			Borehole ID: TEP-GP-106		
Depth (ft)	OVM Reading (ppm)	Temperature (°C)	Depth (ft)	OVM Reading (ppm)	Temperature (°C)	Depth (ft)	OVM Reading (ppm)	Temperature (°C)
<b>Borehole ID: HW-GP-104</b>			<b>Borehole ID: TEP-GP-105</b>			<b>Borehole ID: TEP-GP-106</b>		
Depth (ft)	OVM Reading (ppm)	Temperature (°C)	Depth (ft)	OVM Reading (ppm)	Temperature (°C)	Depth (ft)	OVM Reading (ppm)	Temperature (°C)
55.8	2.0	63	41.3		44	42.0	0.7	50
60.4	2.0	83	51.0		60	50.5		68
64.5	1.3	81	61.0		86	60.8	0.7	86
69.3	1.0	82	64.5		80	70.5	2.2	67
71.5	1.1	84	74.7	2.9	92	75.0	2.0	90
78.0	1.8	90	78.0	0.0	84	78.0		98
84.9		93	79.7		86	79.6	0.0	
88.5	2.6	96	82.7	0.0	96	82.8	2.2	99
95.0	117.0	92	84.1	0.0	88	91.6	0.0	
99.3	2.6	88	89.2	0.0	88	94.5	0.0	88
107.5		90	94.6	4.9	91	97.2	0.0	100
112.5		81	99.7	11.0	90	104.3	0.0	94
			103.0	11.0	92	107.0		98
			107.3	35.0	90	113.8	0.0	88
			108.5	249.0		134.7	0.0	48
			109.9	168.0	88			
			112.6	230.0	80			
			121.2	417.0	68			
			123.6	170.0	62			
			125.0		58			
			134.5	23.0	42			

No OVM readings were taken beyond  
113 ft. due to sloughing in the  
borehole.

## **Appendix E**

### **Laboratory Procedures for Physical and Chemical Measurements**

## **Appendix E-1**

### **Preparing Soil Samples for Physical Measurements**

#### **Procedure**

1. Take specified samples out of the ultra-freezer and leave for approximately 24 hrs. or until defrosted.
2. Select a number of petri dishes corresponding to the number of samples for preparation (e.g. 5 petri dishes for 5 samples).
3. Select "ribbed" watch glasses from drawer in laboratory to be used for covering petri dishes when samples are being oven-dried.
4. Select a coloured piece of paper tape and put around each petri dish such that tape goes about half way around each dish.
5. Weigh each taped petri dish empty (without ribbed watch glass cover) and record weight on tape beginning at the left end. (Caution! Use only black Sharpie permanent marker to record data onto tape.)
6. Select a thawed sample and record the sample ID (e.g. GSB-802-30.5U). Now, while holding sample over petri dish, gently unwrap duct tape on sample. Be careful not to drop sample into petri dish at this point.
7. Next, gently twist off sample top while holding sample over petri dish so as to allow any free grains to fall into petri dish.
8. If the soil in the brass cylinder is not flush with the rim of the cylinder, the depth or height of the soil below or above the rim is estimated and recorded to adjust for the volume of the sample in the cylinder.
9. Using the sample ejector equipment (if sample too compacted to take out of brass cylinder with a spatula or fork), eject sample from brass cylinder as carefully as is possible. The objective here is to lose as little of the sample as possible.
10. Empty contents of brass cylinder into the petri dish and try to reduce sample size by crushing with a fork, ensuring that soil particles which adhere to tine (sp?) of fork are also dusted into petri dish.
11. Reweigh petri dish with its soil contents and record weight next to sample ID. After each record on tape draw a vertical line to the separate it from the next record.

12. Select out between 200 - 250 mg of sample to be sent to the Fruit Growers Laboratory for other analyses.
13. The remaining sample is then crushed using a mortar and pestle and then put into a small jar and capped. Its sample ID number and its local sample ID number (obtained from record book) are noted on the jar before storing.
14. Meanwhile, the tape on each petri dish is carefully removed and placed on a piece of paper in rows. This information is then transferred to the notebook used for recording this type of data.
15. The bulk density is also calculated and recorded in the same book for later use.

## **Appendix E-2**

### **Bulk Volume Analysis**

#### **Procedure**

- (1) Using the radius and height of the cylinder containing the soil, determine the volume of the soil as would be given if the container were filled to the rim.
- (2) Remove the cap and the teflon sheet covering the rim of the cylinder.
- (3) Measure the difference between the soil level and the rim of the cylinder using a metric ruler.
- (4) Again, using the radius of the cylinder to calculate its cross-sectional area, find the volume of the head space above or below the rim of the cylinder.
  - (a) If the top of the soil sample is below the rim of the cylinder, then the volume of the head space is subtracted from the initial volume of the cylinder.
  - (b) If the top of the soil sample is exactly at the rim of the cylinder, then the volume of the head space is 0.
  - (c) If the top of the soil sample is above the rim of the cylinder, then the volume of the head space is added to the initial volume of the cylinder.
- (5) This adjusted or bulk volume is the actual volume the soil occupies when in the cylinder.

#### **Calculations:**

Radius of cylinder	= 3.10 cm
Height of cylinder	= 7.65 cm
Area of cylinder ( $= \pi * r^2$ )	= 30.19 $\text{cm}^2$
Volume of cylinder ( $= A * h$ )	= 231.0 $\text{cm}^3$
Head space	= -3.0 cm
Head Volume ( $= \text{Head Space} * A$ )	= -9.1 $\text{cm}^3$
Thus, the bulk volume of the soil	= Cylinder Vol + Head Vol = 231.0 $\text{cm}^3$ + (- 9.1 $\text{cm}^3$ ) = 221.9 $\text{cm}^3$
<b>Bulk Volume</b>	

## Appendix E-3

### Bulk Density Analysis

#### **Procedure**

- 1 After allowing the soil to dry out and come to room temperature, use an analytic balance to determine the dry weight of the soil.
- 2 Divide the dry weight measured in step 1 by the bulk volume calculated using the "Bulk Volume Analysis" found in the Procedures Manual to determine the bulk density of the soil.

#### **Calculations:**

##### **Example:**

Radius of cylinder	= 3.10 cm
Height of cylinder	= 7.65 cm
Area of cylinder (= pi * r <sup>2</sup> )	= 30.19 cm <sup>2</sup>
Volume of cylinder (= A * h)	= 231.0 cm <sup>3</sup>
Head space	= -3.0 cm
Head Volume (= Head space * A)	= -9.1 cm <sup>3</sup>
Adjusted Volume (= Cylinder Vol - Head Vol)	= 221.9 cm <sup>3</sup>
Dry weight of soil	= 409.4 g
<b>Bulk Density</b>	= 409.4 g/221.9 cm <sup>3</sup>
	= 1.8 g/cm <sup>3</sup>

## **Appendix E-4**

### **Percent Gravel Calculation**

#### **Procedure**

1. Once the soil is dried in the oven, it is cooled for about 2 hours and the dry weight recorded.
2. Measure out 250 grams and transfer it into a paper cup. This portion will be sent to the Fruit Growers Lab for further analysis.
3. Crush the remaining portion of the soil in a mortar.
4. Sieve the soil through a 2.00-mm grade mesh. What remains on top are considered gravel.
5. Weight the gravel and record.
6. Percent gravel is the weight of gravel divided by the weight of the soil before sieving.

#### **Sample Calculations**

$$\begin{aligned}\text{Wt. of soil before sieving} &= 250.0 \text{ grams} \\ \text{Wt. of gravel} &= 100.0 \text{ grams} \\ \text{Percent gravel} &= (100.0/250.0)*100 \\ &= 40 \% \text{ gravel}\end{aligned}$$

## **Appendix E-5**

### **pH Analysis**

#### **Procedure**

1. Altem 60 pH meter by Beckman will be used to determine the pH.
2. The meter must be calibrated using pH 7 and pH 10 buffers before any sample reading is taken. The instructions for calibration is under the pH meter.
3. Using a small spatula, mix 10 grams of soil with enough double distilled water to make a saturated paste\*. 10 grams of previously dried and sieved sample are used to assure complete covering of the probe.
4. Let sample sit for an hour so that it may equilibrate.
5. Remix sample using probe, then record result as sample is mixing.

---

\* See Soils: An Introduction, by Michael J. Singer and Donald N. Munns, University of California, Davis, p. 284.

## **Appendix E-6**

### **Gravimetric Water Content**

#### **Procedure**

1. Prepare a 150mm\*75mm KIMAX Crystallizing Dish with a cover watch glass and a name tag for each sample.
2. Weigh the empty dish without the cover and record it on the name tag. This is the **tare weight**.
3. After taking head space reading, empty the content into the dish.
4. Weigh the dish with the soil. (again, the cover is not included.) Record on the name tag. This is the **wet soil+tare weight**.
5. Dry the covered dish in a 60 degree Celsius oven for 48 hours.
6. Let the dish cool to room temperature and weigh it. (without the dish) Record on the name tag. This is the **dry+tare weight**.
7. Percent moisture is the wight difference between the wet and dry weight divided by the dry weight and multiplied by 100.

#### **Example**

Tare: 150.0 grams

Tare + Wet weight: 750.0 grams

Tare + Dry weight: 700.0 grams

Percent Moisture = (Wet - Dry)

Dry \* 100

$$= \underline{(600.0 - 550.0)}$$

$$550.0 * 100$$

$$= 9.1 \%$$

## **Appendix E-7**

### **Volumetric Water Content**

#### **Procedure**

Volumetric water content is a product of the dry bulk density and the gravimetric water content. The equation is:

$$\text{Volumetric Water Content} = \frac{\text{Gravimetric Water Content}}{\text{dry bulk density}} \times \frac{\text{dry bulk density}}{\text{density of water}}$$

#### **Example:**

dry bulk density = 1.82 gm/cc

density of water = 1.00 gm/ml

Gravimetric water content = .13

$$\begin{aligned}\text{Vol. Water Content} &= 0.13 \times 1.82 / 1.00 \\ &= 0.2366 \\ &= 23.66 \%\end{aligned}$$

## Appendix E-8

### Particle Density Analysis

#### Procedure

- 1 Weigh out approximately 10.00g of oven-dried soil to the nearest 0.01g. Record weight in log book. Set aside weighed soil sample (may be weighed in a weighing boat).
- 2 Add 10.0 ml of distilled water to a sterilized 25-ml graduated cylinder. Ensure that the bottom of the miniscus is at the 10-ml mark of the cylinder.
- 3 Measure out an additional 10.0 ml of distilled water in a separate 10-ml measuring cylinder.
- 4 Carefully add all of the 10g of soil to the 25-ml cylinder containing 10 ml of distilled water.
- 5 Next, using a sterilized pipette or syringe, draw up some distilled water from the 10-ml cylinder (approx. 5 ml) and use it to wash down any soil particles adhered to the walls of the (25-ml) cylinder.
- 6 With a glass stopper firmly in place in the 25-ml cylinder (filled with distilled water and soil), shake the cylinder up and down for approximately 10 times - each up and down motion being counted as one time.
- 7 Set the 25-ml cylinder down, then slowly removing the glass stopper, rinse it carefully with some of water from the 10-ml cylinder so that any soil and water still adhered to it will be washed down into the 25-ml cylinder. Then with the remaining distilled water in the 10-ml cylinder, carefully rinse the walls of the 25-ml cylinder containing the mixture of soil and water. Make sure that all of the remaining fluid in the 10-ml measuring cylinder is added to the 25-ml cylinder.
- 8 Put the glass stopper back in place (in the 25-ml cylinder) and allow the cylinder to sit for about 2-4 hrs. before reading and recording the new volume of the mixture. Again, be careful to read the volume at the minimum point on the miniscus.

## **Calculations:**

**Example:**

Initial Volume in 25-ml cylinder = 10.0 ml

Additional volume of water added = 10.0 ml

Hence, total volume of water in cylinder = 20.0 ml

Dry weight of soil added to cylinder = 10.00g

Volume of soil/water mixture in cylinder = 23.8 ml

Therefore, 10g of soil displaced (23.8ml-20.0ml) 3.8ml of water. Hence, particle density of soil (density = mass/volume)

$$= 10.00\text{g}/3.8\text{ml} \quad (1\text{ml} = 1\text{cc})$$

$$= 10.00\text{g}/3.8\text{cc}$$

**Particle density** = **2.63g/cc**

## **Appendix E-9**

### **Porosity Calculations**

#### **Procedure**

Porosity is a value calculated from bulk density and particle density measurements (Refer to procedural manual for calculations of these quantities.) The porosity is given by the formula:

$$\text{Porosity} = \left[ 1 - \left( \frac{\text{Bulk Density}}{\text{Particle Density}} \right) \right]$$

#### **Calculations**

Bulk Density                   = 1.69 g/cc

Particle Density               = 3.10 g/cc

Porosity                       =  $1 - (1.69 \text{ g/cc})/(3.10 \text{ g/cc})$

Porosity                       = **0.4548**

## Appendix E-10

### Distribution Coefficient - Kd Measurement

Sorption constants (Kds) are ratios of the amount of a chemical sorbed to the soil or sediment particle compared to the amount of the same chemical in solution. In this laboratory we use a modified version of the EPA batch isotherm procedure to determine Kds for the contaminants found at LLNL. We typically process eight sediment samples at a time, for efficiency of operation. We use carbon-14 labeled compounds in our procedure to simplify analysis. The carbon-14 labeled compounds selected are based on their availability and cost, as well as, relationships to potential contaminants at LLNL. In our laboratories, Trichloroethylene (TCE) and tetrachloroethylene (PCE) are used in sorption studies to represent the volatile organic compounds(VOCs) present as contaminants at this site. Previous studies have shown that TCE and PCE sorb more than most other VOCs found at this site, so should provide an uppermost sorption capacity of our localized soils and sediments. Toluene and benzene were selected to represent the BTEX compounds present at the gasoline spill area. Few other gasoline compounds are available as the carbon-14 labeled form. In the protocol described below, toluene will be used to define the calculations. However, the process is the same for any chemicals used.

#### Required materials:

Potassium Perchlorate  $\text{KClO}_4$  (reagent grade)

radioactive  $^{14}\text{C}$  Toluene (or other chemicals)

8 sediment samples labeled #1-8

Pure Toluene (reagent grade)

Methanol

Universol scintillation cocktail

33 50ml Pyrex brand glass test tubes

33 silicon discs by Kimble (0.090", blue) catalog #73818X24

33 Teflon caps with holes on top (blue)

colored paper tapes

2-liter volumetric flask

250ml volumetric flask

25 and 100 microliter syringe with 20 or 21 gauge needle

1 milliliter syringe with 20 or 21 gauge needle rubber gloves and lab coat

2-liter separatory funnel parafilm

67 Kimble brand disposable glass scintillation counter vials.

5 gallon Carboy containers for liquid waste

Safety: Please refer to Operational Safety Procedures (OSP) #377.5

## Procedure

### 1. Check, Clean, and Label Glassware

Each of the 33 test tubes must be checked on the rim for cracks. This is best done by holding them against the light to look for rim reflections. Solutions may leak if cracks exist. Throw cracked ones in the can marked glass. Tubes with the same mark or number are considered the same size. All new tubes should be sized and labeled before use.

The tubes and the caps must be rinsed with methanol before using. Use a squirt bottle to rinse the inside of the tube. Half a milliliter of methanol per tube is enough. The caps along with their fitted silicon discs are lightly sprayed with methanol using the same squirt bottle. Do not dump the methanol from the tubes down the sink. Dump it into a liquid waste carboy appropriately labeled. The tubes and caps will be dried in an oven set at 60 degrees Celsius. Once they have been dried, they will be capped and labeled with the color paper tape. The tubes will be divided into two groups. One group, consisting of 9 tubes, will be the control group (labeled control-1 through control-9). The rest will be divided into 8 subgroups of three each. Subgroup 1 will be used for sediment sample #1 and subgroup 2 for sediment #2 and so on. The three tubes of subgroup 1 will be labeled #1-1, #1-2 and #1-3. The rest are the same.

### 2. Making 0.01 Molar KClO<sub>4</sub> solution

In a 2 liter volumetric flask, fill to the mark with double distilled water and add 2.774 grams of Potassium Perchlorate. Drop in a stirbar and mix until the KClO<sub>4</sub> is completely dissolved and the solution is clear. The duration varies from half-an-hour to an hour.

## Calculation

$$2.774 \text{ grams} \times \frac{1 \text{ mole KClO}_4}{138.6 \text{ grams}} = 0.020 \text{ moles KClO}_4$$

$$\frac{0.020 \text{ moles KClO}_4}{2 \text{ liter of solution}} = 0.010 \text{ M solution}$$

### 3. Making the 100ppm Toluene solution

In a 250 milliliter volumetric flask, add 28.87 microliters of pure, reagent grade toluene to 250ml of double distilled water. Add stirbar and stir for at least an hour. Refrigerate for at least 2 hours before using.

#### Calculation

$$\text{Toluene: } \rho = 0.866 \text{ grams/ml}$$
$$100 \text{ ppm} = \frac{100 \text{ grams}}{1,000,000 \text{ ml}} = \frac{X \text{ grams}}{250 \text{ ml}}$$
$$X = 0.025 \text{ grams}$$
$$\frac{0.025 \text{ grams}}{0.866 \text{ grams/ml}} = 0.02887 \text{ ml} = 28.87 \text{ microliters}$$

### 4. Weighing the soil

While the toluene and the KClO<sub>4</sub> solutions are stirring, measure out exactly 1.000 grams (+/- 0.003 grams) of soil into every tube. Each tube of subgroup 1 will contain 1 gram of soil from sample #1. This is done for the rest of the subgroups.

### 5. Rearrange the tubes

The tubes are arranged in a special pouring order. Instead of having all three tubes of subgroup 1 poured one after another, they will be separated. This prevents the error of having some groups getting more radioactive material and others less. The sequence is as follows:

- (first) Control-1, control-2, #1-1, #2-1, #3-1, #4-1
- control-3, #5-1, #6-1, #7-1, #8-1
- control-4, #5-2, #6-2, #7-2, #8-2
- control-5, #1-2, #2-2, #3-2, #4-2
- control-6, #8-3, #7-3, #6-3, #5-3
- control-7, #4-3, #3-3, #2-3, #1-3
- control-8, control-9 (last)

### 6. Making and Pouring the 500ppb Solution

Remove and discard 10 milliliter of KClO<sub>4</sub> solution from the volumetric flask. Transfer the rest to a 2 liter glass bottle equipped with a stirbar and a ground glass stopper. Add 10 milliliter of 100ppm toluene solution. Rinse the 100 microliter syringe in methanol 3 times before inserting into the radioactive solution. Measure

out 32 microliters of radioactive toluene, and spike it into the glass bottle. Parafilm the bottle neck and stir the solution for a minimum of 15 minutes.

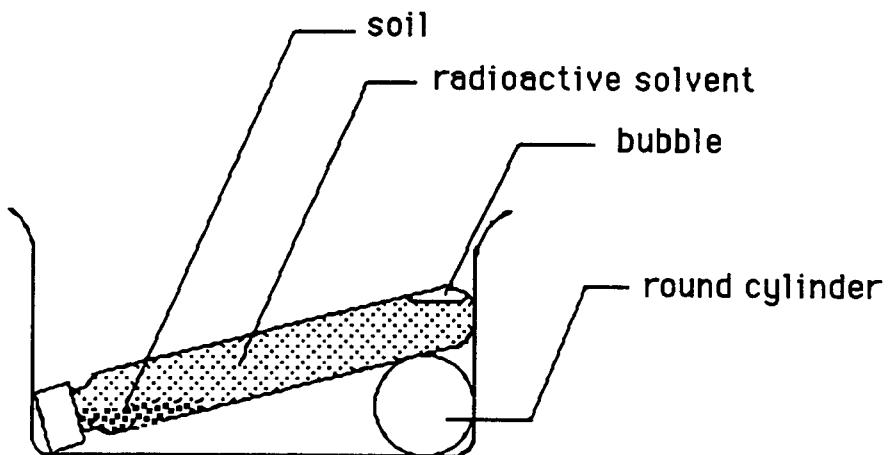
The homogeneous solution is then transferred to a 2 liter separatory funnel. Discard the first 10 to 20 milliliters. Using the stop cock as regulator, fill all the tubes starting with control-1. The important point here is to be consistent. Try to fill the tubes to the same height each time. A good place would be the line between the neck and the cylinder body of the tube. Cap and parafilm each tube.

Note: The remaining portion of the 100ppm solution is parafilmed again and stored in the refrigerator for future use. For next time, the solution must first be stirred for 5 minutes before using. A fresh 100 ppm solution should be prepared after three weeks.

## 7. Shaking the Tubes

The tubes must go on a shaker table for a period of 48 hours. The tubes are layered in plastic containers (See fig. 2). The tubes will lie horizontally with the cap end slightly lower than the glass end. This not only increases the surface area between the soil and solution, but it also traps the air, preventing loss by evaporation through the lid. The tubes are protected from bumping against each other by separating them with a piece of SOFT-TECH wipers. All 33 tubes will go into one container, which is covered with aluminum foil to prevent UV absorption.

A three way switch is located under the platform. Up position is fast rotation, middle is off, and lower position is slow. The slow position is used.



SIDE VIEW OF CONTAINER

Fig.2

## 8. Centrifuge the tubes

All of the tubes except control-9 will be centrifuged for a period of 30 minutes. This step marks the stopping point of interaction between the soil and radioactive

solution. The 32 tubes will be in two batches since the centrifuge holds 16 tubes at a time.(See fig. 3) The tube holder consists of two parts. One part is a metal, pivotal ring and the other is a metal, cylinder tube holder. A Styrofoam strip should be inserted between the glass tube and the metal cylinder tube holder to prevent rattling which could lead to breakage during the centrifugation process. Each part has its own weight carved on it. These weights should match exactly the two parts directly opposite it. They can be checked on a balance to verify the weights. The front control panel has a timer setting and a switch. The switch has three positions: OFF, ON WITH TIMER, and ON WITHOUT TIMER. The timer does not work. Timing the centrifuge must be done manually with the position on the ON WITHOUT TIMER. A speed dial is located on the side of the panel. The setting for this experiment is at 30. The tubes are refrigerated for 90 minutes following centrifuging so they are always at the same temperature when sampling.

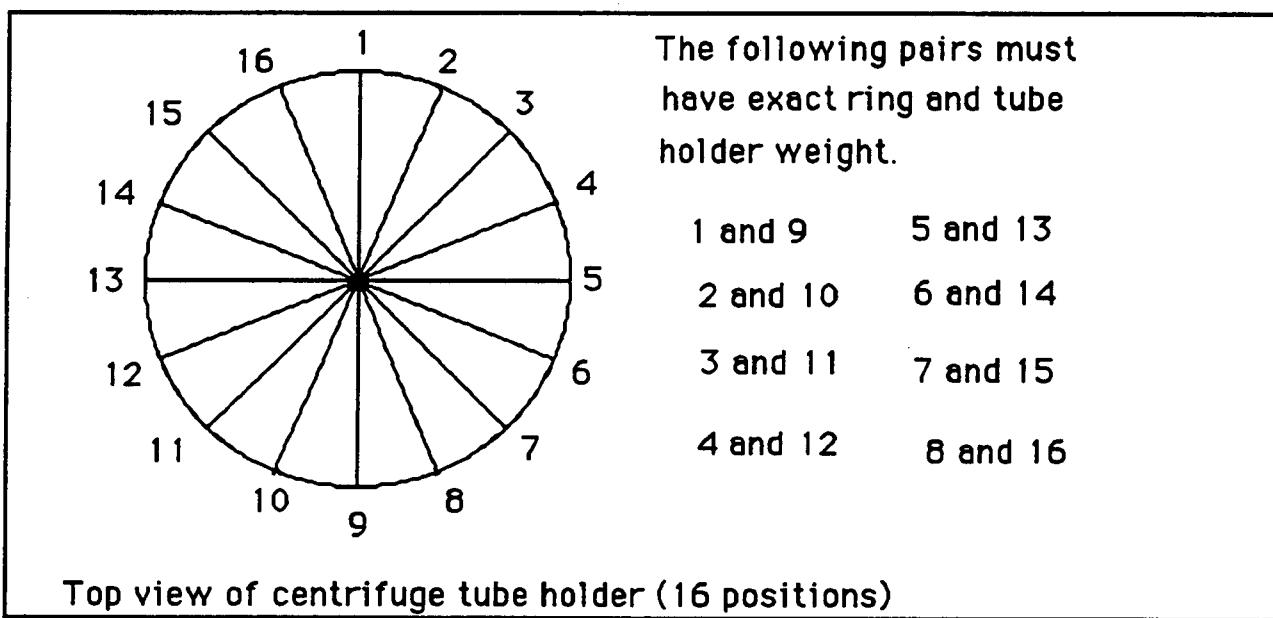


Fig. 3

### 9. Prepare scintillation vials

Two samples of 1 milliliter each will be taken from each test tube. This requires a total of 67-20 milliliter scintillation vials. ( $33*2+(1 \text{ blank})=67$ ) They are labeled with the same pouring sequence numbering except everything is doubled. (control-1, control-1, control-2, control-2, etc.) The 1 milliliter sample solution will be mixed with 15 milliliters of scintillation cocktail. The cocktail enables the counter to detect the radiation. A repipeter is used to pipet the cocktail. Care should be given to minimize the time between pipetting the sample into the vial and adding the scintillation cocktail and capping the vial to prevent loss of volatiles from samples.

## 10. Sampling

A good indication that the tubes have had enough time to cool is the immediate condensation of water on the outside of the tubes right after removal from the refrigerator. Four samples are taken out at a time. This assures the samples taken are at relatively the same temperature. The 1 milliliter syringe is rinsed a few times with control-1 solutions. This is done by drawing solution up the chamber and then pushing it back.

To take a sample, draw up solution pass the 1 milliliter mark. If a bubble is present, then it must also be pass the mark.(See Fig. 4) Flip the syringe and allow the bubble to move up to the needle tip. (See Fig.5) Cover needle with a tissue. Move the plunger up and align the marks on it to the 1 milliliter mark letting excess solution go into tissue. Be consistent. Always stop at the same place.(See Fig.6) Quickly inject into the vial and add the cocktail. Cover quickly and shake the mixture for a few seconds. When all the samples have been taken, transfer the vials to the counter. Program #1 pin is inserted into the special slot in front of the first vial. This tells the counter to count for  $^{14}\text{C}$ . Press ENABLE+FORWARD to start counting. An operation manual is on the table next to the machine. Discard contaminated tissues and gloves into appropriate hazardous waste containers.

## 11. Counting Results and Computer Entry

The printout will look like the following:

PROGRAM *= 1
REGION A: LL-UL= 0-156 LCR= 0 BKG= .00 % 2 SIGMA= .0
REGION B: LL-UL= 4-156 LCR= 0 BKG= .00 % 2 SIGMA= .0
REGION C: LL-UL= 0-0 LCR= 0 BKG= .00 % 2 SIGMA= .0
TIME= 5.00 K=1.000 QIP=SIE/AEC
P# S# TIME CPMA/K %DEV CPMB/K %DEV CPMC/K %DEV SIE SIS FLAGS MIN
1 1 5.00 3607.8 1.49 3539.2 1.50 .00 .00 579 72.12 6
1 2 5.00 3584.2 1.49 3524.6 1.50 .00 .00 579 71.84 12
AND SO ON.....

Fig. 7

P# stands for the program number. S# stands for sample vial number. S#1 corresponds to the first vial of control-1, and #2 corresponds to the second vial of control-1. S#3 and #4 corresponds to control-2. CPMA/K stands for counts per minute in Region A. Kd of the soil will be determined from this data.

There is a blank file made that has all the formulas built in to it. All that needs to be done is plug in the numbers. See the Appendix, for a copy of the blank file and a sample sheet. The following represents breakdown of the summary sheet.

Controls	1st set	2nd set	Selected	Average
C1A	3297.4	3284.6	*3284.6	3362.6
C1B	3362.6	3295.8	3362.6	
C2A	3344.2	3337	3344.2	3383.5
C2B	3422.8	3358.6	3422.8	
C3A	3402.6	3363	3402.6	3377.4
C3B	3343.6	3352.2	3352.2	
C4A	3340.6	3386.8	3386.8	3354.5
C4B	3322.2	3314.4	3322.2	
C5A	3377.6	3312.6	3377.6	3395
C5B	3412.4	3359.6	3412.4	
C6A	3392	3368.2	3382	3368.3
C6B	3354.6	3315	3354.6	
C7A	3445.6	3357.4	3445.6	3410.9
C7B	3376.2	3348	3376.2	
C8A	3270.6	3333.8	3333.8	3330
C8B	3326.2	3263	3326.2	
C9A	3376.2	3337.4	3376.2	3363.5
C9B	3305.2	3350.8	3350.8	
				3371.74
				23.58

The above insert contains all the control vial counts. Each vial is read twice and those data goes in the 1st and 2nd set column. Generally speaking the first set of counts are used unless there appears to be a counting error or large deviation or inconsistency. The best data is selected and inserted into the SELECTED space. The number 3362.6 under AVG is the average of C1A and C1B. 3371.74 at the bottom is the average of all those averages. 23.58 is the standard deviation. Those with an asterisk are rejected data because there is an indication that the tube could have leaked or there is some unexplained large inconsistency or deviation.

S128	1st set	2nd set	Selected	Average
1a	3314.2	3323.6	3323.6	3335.9
1b	3348.2	3371.4	3348.2	
2a	3369.8	3391.2	3369.8	3369.8
2b	3418.8	3437.4	*3437.4	
3a	3317.6	3328.4	3317.6	3326.1
3b	3334.6	3345.8	3334.6	
				3343.93
				22.93

This is an insert of sample number S128. The data from all three tubes of S128 are here. 1a and 1b are from tube S128-1. 2a and 2b are from S128-2. 3a and 3b are from S128-3. 3343.93 is the number used in calculating the Kd. There will be 8 of these sets in the sheet.

SED	% Sorbed	CS	CW	Kd	norm	%gravel
S128	0.0082483	0.0004124	0.0009918	0.42	0.41	0.4
S129	0.0068148	0.0003407	0.0009932	0.34	0.34	1.7
S130	0.0044125	0.0002206	0.0009956	0.22	0.21	3
S131	0.0042939	0.0002147	0.0009957	0.22	0.21	1.3
S132	0.0066072	0.0003304	0.0009934	0.33	0.33	0.5
S133	0.0015159	7.579E-05	0.0009985	0.08	0.06	20.4
S134	0.0072696	0.0003635	0.0009927	0.37	0.37	0
S135	0.0018421	9.211E-05	0.0009982	0.09	0.04	52.4

$$\% \text{ sorbed} = (\text{control ave.} - \text{sample ave.}) / \text{control ave.}$$

$$\text{CS : concentration of soil} = \frac{(\% \text{ sorbed}) (\text{conc. microgram/liter}) (\text{liter of solution})}{\text{gram of sediment}}$$

$$\text{CW : concentration of solution} = \text{microgram / milliliter}$$

$$Kd = \frac{\text{CS}}{\text{CW}} = \frac{\text{microgram/gram}}{\text{microgram/milliliter}} = \text{milliliter / gram}$$

$$\text{Norm.} = \text{normalized Kd} = Kd - (Kd * \% \text{ gravel} / 100)$$

The table above shows the summary of all eight samples. The percent gravel is the amount of gravel present after the initial soil sieving(>2 mm). The "norm" shows the Kd corrected for gravel content which assumes that the gravel particles do not have any sorption capacity for these contaminants.

## 12. Cleaning Up

Not to worry. There is no need to get the scrubber and soap out. There won't be any actual cleaning to do. Please remember not to pour anything down the sink, and any material that came in contact with the solution must go into the box marked Radioactive Waste. A 5 gallon, plastic container, called carboy, is used to contain the liquid waste. A cardboard box lined with a plastic bag is used for solid radioactive waste. There should be radioactive labels on both indicating their contents. (See Appendix for examples of these labels.)

The parafilm and the septa are thrown away. The cap is reused. The solution goes into the carboy. There should not be any soils remaining in the tubes. They are

soaked for 1 day in a bucket filled with 1:5 ratio radii wash and water, and will then be transferred, with the labels peeled off, to another bucket filled with soapy water located in the sink. The BioMed stock room staff will collect the glassware and clean them. This takes about 1 day before the clean tubes are returned. The process starts again with the methanol washing of the tubes.

The 2 liter volumetric flask for the KClO<sub>4</sub> solution will not be washed since it will be used again and again. This is true for all glasswares except the tubes.

When the carboy or the cardboard box are filled, then it must be prepared for removal by the Hazards Control staff. The box should be taped up on all sides. A swipe is done on each container. This is done by taking a small strip(roughly 2 x 3 inches) of Kimwipe and wiping the outsides of the container. Put the strip in a scintillation vial and add 15ml of cocktail. Count the solution and record it on the waste sheet under Swipe Survey. A radioactive waste form is filled out for each container. There are a few sample sheets in the Appendix, starting on page #3.

### 13. Misc. Notes

The radioactive c-14 labeled toluene comes from the maker in a long, funny looking glass tube. It contains a vacuum chamber with a pig-tail attached to it.(See fig. 8) The pig-tail points to the open end. The tube rests in a beaker of ice throughout the whole extraction process. While the tube is chilling, rinse out two conical vials, complete with caps, septas, with methanol. Measure out exactly 3ml of methanol in one vial and chill it also on ice. Add a portion of it (roughly 2.0ml) through the open end and submerge the pig-tail. Break the tail with a metal scupula. The vacuum will pull the methanol into the chamber. Widen the hole and allow all the methanol to run into the chamber. Rinse the insides of the chamber with the methanol using the long needed syringe especially fitted for this job. Transfer the methanol into a conical vial. Add the remaining portion of methanol into the chamber and rinse it. Combine the methanol portions and label the conical vial. Dispose the tube in the radioactive waste box.

To determine the concentration of counts in the new c-14 solution, spike 10 microliters of it in 15ml of cocktail and count it. This number will be used to calculate how much is needed for reaching a reading of 3000 on the counter. See example below.

All readings should be around 3000 counts/ml

(counts/ml)\*(mls of solution)

(counts/microliter of spike) = microliter of spike to add

example:

3000counts/ml \* 2000ml

240,000counts/microliter = 25 microliters to add to soln.

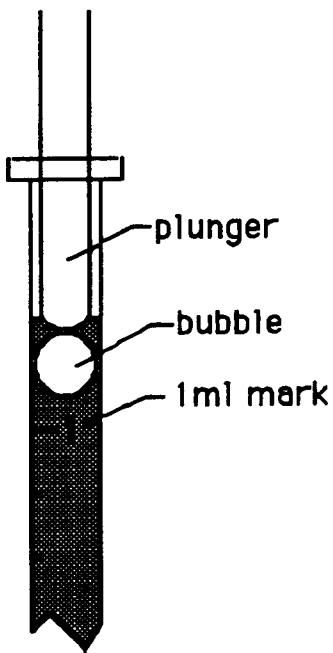


Fig. 4

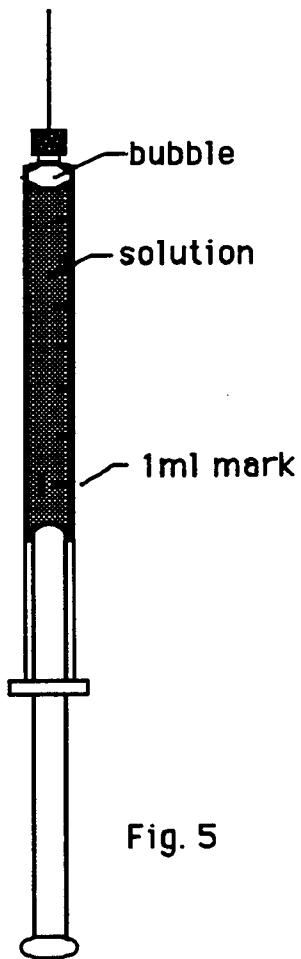


Fig. 5

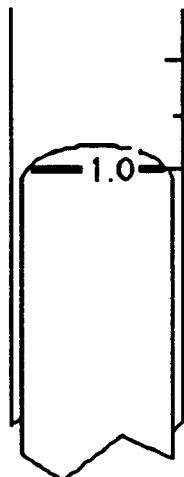


Fig. 6

## **Appendix F**

### **Pre- and Post-Steam Injection Data**

Appendix F-1. Pre-steam injection data.

Depth (ft)	Lithology	Data						Water Content	Bulk Density (g/cm <sup>3</sup> )	Particle Density (g/cm <sup>3</sup> )	Porosity (%)	pH	Kd norm-Tol (mL/g)	CEC (meq/100g)	Org C (%)	Permeability × E-07 (k-cm/sec)								
		DBSL		FGL																				
		Gravel %	Gravel %	Sand %	Silt %	Clay %	Weight %	Volume %																
<b>SVB-GP-008A</b>																								
27.50	cly/sandy/silt	2	0	30	41	29	14.8	26.2	1.77	2.94	0.40	7.17	0.13	32.8	0.06	27.5								
27.90	sandy clay						14.9	27.9	1.87		*0.29													
29.00	cly/silty/sand	10	3	35	34	28	15.3	27.4	1.79	2.78	0.36	7.20	0.21	33.4	0.14									
30.00	cly/grvly/silty/snd	18	31	34	20	15	12.1	19.7	1.63	2.94	0.45	7.40	0.25	21.4	0.04									
30.50	sandy clay								1.63															
30.80	sandy clay						19.9	33.2	1.67		*0.37					0.163								
31.70	sandy silt						18.3	29.1	1.59		*0.40					41								
33.30	silty sand	1	2	55	32	11	14.8	23.0	1.56	2.50	0.38	7.64	0.43	21.4	0.01									
33.70	sandy silt						18.4	29.2	1.59		*0.40					1380								
33.90	sandy silt								1.67															
34.00	cly/sandy/silt	0	0	35	43	22	18.7			2.50			7.62		26.9	0.02								
34.50	sandy silt						18.5	29.8	1.61		*0.39					812								
35.90	sandy silt						19.5	33.3	1.71		*0.35					0.839								
36.00	cly/silty/sand	1	0	39	33	28	16.4	29.2	1.78	2.63	0.32	7.61	0.43	30.2	0.10	3.72								
37.30	silty sand						16.1	28.8	1.79		*0.32													
40.00	sand	8	6	69	14	11	10.3			2.50			7.58		19.0	0.07								
40.50	sandy silt						11.1	17.1	1.54		*0.42					3360								
41.00	cly/silty/sand	2	0	39	37	24	16.5	25.6	1.55	2.78	0.44	7.72	0.36	25.4	0.07									
42.00	cly/silty/sand	2	0	47	27	26	14.9			2.94			7.76	0.61	27.1	0.09								
42.20	sandy silt						15.6	26.8	1.72		*0.35					487								
42.50	sandy silt								1.70															
43.00	cly/silty/sand	1	0	49	27	24	16.1			2.78			7.83		27.0	0.07								
43.30	sandy silt								1.61															
45.40	cly/sandy/silt						17.3	28.5	1.65		*0.38					87.4								
46.00	cly/silty/sand	0	0	40	32	28	21.2			2.50			7.83	1.00	30.0	0.07								
46.40	sandy silt								1.71															
46.80	cly/sandy/silt						22.8	36.5	1.60		*0.40					40.1								
47.80	sandy silt								1.49															

Appendix F-1. Pre-steam injection data. (Continued.)

Depth (ft)	Lithology	Data						Weight %	Volume %	Bulk Density (g/cm <sup>3</sup> )	Particle Density (g/cm <sup>3</sup> )	Porosity (%)	pH	Kd norm- Tol (mL/g)	CEC (meq/100g)	Org C (%)	Permeability × E-07 (k=cm/sec)											
		DBSL				FGL																						
		Gravel %	Gravel %	Sand %	Silt %	Clay %																						
<b>SVB-GP-008A</b>																												
48.00	sandy/silty/clay	0	0	30	34	36		21.4			2.50			7.66	0.76	33.6	0.07											
48.20	silty sand							23.2	37.3	1.61		*0.39							0.292									
50.40	silty sand									1.59																		
50.80	cly/silty/sand	0	0	36	34	30		20.0			2.63																	
51.10	silty sand							15.0	26.9	1.79		*0.33			7.25	0.84	34.0	0.12										
52.00	sandy/cly/alt	1	0	24	46	30		15.2			2.50				7.21	0.92	32.1	0.08										
52.60	sandy silt									1.87																		
52.90	sandy silt							16.6	30.8	1.86		*0.30							0.532									
56.00	silty clay							16.7	30.1	1.80		*0.32							1.59									
60.40	sandy silt							22.0	34.7	1.58		*0.40							53.9									
61.00	cly/sandy/alt	1	0	32	42	26		20.8			1.62																	
61.10	sandy silt														7.92	0.35	35.3	0.06										
63.00	cly/silty/sand	0	0	60	20	20		15.3								0.52	28.2	0.07										
63.30	sandy silt									1.69																		
63.90	silty sand							14.3	22.8	1.59		*0.40							233									
65.00	sandy/cly/alt	0	0	26	40	34		16.9			2.50					0.87	26.9	0.08										
65.50	clayey silt							19.2	32.4	1.69		*0.36							6.19									
65.80	clayey silt									1.72																		
66.90	cly/sandy/alt							18.4	30.4	1.65		*0.38							105									
67.00	cly/sandy/alt	0	1	32	43	24		18.5			2.50				7.98	0.57	27.1	0.04										
67.20	cly/sandy/alt									1.74																		
68.00	cly/silty/grvly/snd	19	17	51	17	15		12.5			2.50					0.50	12.1	0.06										
68.40	silty sand							14.4	23.6	1.64		*0.38							19									
68.70	silty sand									1.70																		
69.00	silty/grvly/sand	40						12.0								7.96	0.40	17.0	0.09									
69.30	cly/sandy/grvly									1.30																		
71.90	sandy gravel	69	62	28	3	7		6.5			2.50						7.4	0.03										
74.70	gravelly sand							16.7	27.9	1.67		*0.37							11.9									

Appendix F-1. Pre-steam injection data. (Continued.)

2-156

Depth (ft)	Lithology	Data												Permeability x E-07 (k=cm/sec)			
		DBSL		FGL				Water Content		Bulk Density (g/cm <sup>3</sup> )	Particle Density (g/cm <sup>3</sup> )	Porosity (%)	pH	Kd norm- Tol (mL/g)	CEC (meq/100g)	Org C (%)	
		Gravel %	Gravel %	Sand %	Silt %	Clay %	Weight %	Volume %									
<b>SVB-GP-008A</b>																	
75.00	cly/silty/sand	0	0	48	27	25	15.1	24.7	1.64	2.50	*0.34			0.77	25.7	0.03	
78.60	silty/sand						16.7	27.0	1.62		*0.39						1690
79.00	cly/silty/sand	1	1	49	29	21	17.5			2.63			7.94				
79.20	silty sand								1.54								
80.00	silty sand						15.1	24.3	1.61		*0.39						676
81.00	sand	5	3	87	3	7	6.4			2.63				0.38	12.2	0.05	
81.60	grvly/silty/sand								1.54								
82.50	grvly/silty/sand								1.54								
83.00	gravelly sand	52	45	50	1	4	4.8			2.50				0.11	6.8	0.04	
84.00	sandy gravel	42	56	38	2	4	5.6			2.63					6.5	0.04	
84.60	sandy gravel								1.69								
85.50	clayey silt								1.66								
86.00	cly/silty/sand	9	2	49	28	21	14.7	24.2	1.65	2.50	0.34			0.44	21.4	0.03	206
<b>SVB-GP-013</b>																	
3.70	sity/sndy/clay	4	4	33	20	43	14.6	26.7	1.83	2.54	0.28	7.27			19.6	0.47	
4.20	silty clay																0.414
10.40	sandy gravel	70					1.0	1.8	1.74	2.55	0.32				2.2	0.03	
15.50	sandy silt																31.1
19.50	cly/silty/sand	1	3	45	26	26	11.8	18.1	1.53	2.43	0.37	7.51			16.4	0.12	
26.70	sandy clay																**14.8
27.80	sity/cly/sand	5	2	46	20	32	12.5	22.1	1.76	2.63	0.33	7.97			20.7	0.12	
36.50	clayey sand	6	6	65	13	16	8.8	15.0	1.71	2.70	0.37				11.2	0.07	
38.60	sndy/silty/clay																17.9
47.30	cly/silty/sand	1	0	49	30	21	17.2	27.0	1.57	2.63	0.40				23.6	0.08	
48.40	sndy/silty/clay																36.5
56.50	cly/silty/sand	0	0	42	39	19	19.1	30.4	1.59	2.70	0.41				18.1	0.06	
57.00	clay w/ calc nodules																14.3
67.00	cly/sndy/silt	0	0	34	37	29	17.4	29.7	1.71	2.63	0.35				25.5	0.08	

**Appendix F-1. Pre-steam injection data. (Continued.)**

Depth (ft)	Lithology	Data										Permeability x E-07 (k=cm/sec)					
		DBSL		FGL			Water Content			Bulk Density (g/cm <sup>3</sup> )	Particle Density (g/cm <sup>3</sup> )	Porosity (%)	pH	Kd norm- Tol (mL/g)	CEC (meq/100g)	Org C (%)	
		Gravel %	Gravel %	Sand %	Silt %	Clay %	Weight %	Volume %									
<b>SVB-GP-013</b>																	
68.60	sandy/silty/clay													11.5			
77.00	sity/cly/sand	6	0	58	19	23	13.5	22.2	1.65	2.63	0.37		17.6	0.06	82.3		
88.30	sandy gravel	65	56	32	3	9	5.1	6.5	1.28				6.6	0.04			
<b>SVB-GP-014</b>																	
2.80	sity/cly/sand	6	9	37	26	28	8.0	14.8	1.85			7.21		17.5	0.18		
6.90	clayey sand														15.8		
13.20	sandy gravel	52	50	45	0	5	2.1	3.4	1.63			7.23		4.9	0.04		
20.10	sandy clay														0.714		
23.10	sandy/cly/silt	0	0	15	58	27	16.4	25.7	1.57			7.05	0.37	33.6	0.03		
28.50	sandy clay														1820		
34.01	sity/cly/sand	6	10	52	16	22	10.6	15.6	1.47	2.78	0.47	7.86	0.82	17.6	0.05		
39.10	sandy clay														490		
41.80	sity/cly/sand	4	4	42	23	31	14.3	24.2	1.69			7.59	0.55	25.4	0.10		
50.80	silty sand														888		
51.40	sity/grvly/sand	12	24	41	21	14	7.7	11.4	1.48	2.94	0.50	7.74		8.2	0.05		
60.10	clayey sand														155		
63.20	gravelly sand	37	46	45	2	7	7.0	12.5	1.78	2.94	0.39	7.89		7.1	0.03		
69.70	sandy clay														0.432		
72.70	sity/cly/sand	2	3	43	25	29	13.5	25.0	1.85	2.63	0.30	7.54		20.8	0.06		
78.50	silty sand														1390		
82.70	sandy gravel	80	76	18	2	4	4.0	6.5	1.63	2.50	0.35	7.35		1.1	0.03		
88.30	cly/grvly/sand	27	27	44	9	20	12.5	20.0	1.60	2.50	0.36	7.35	0.31	18.3	0.05		
<b>GSB-710</b>																	
5.50	clayey silt								1.51						15.9		
15.50	sandy silt								1.63						47.1		
17.80	sandy silt								1.48						1200		
22.00	slity clay								1.28						2270		
28.80	clayey silt								1.74						14.8		

**Appendix F-1. Pre-steam injection data. (Continued.)**

**Appendix F-1. Pre-steam injection data. (Continued.)**

Depth (ft)	Lithology	Data												Permeability × E-07 (k=cm/sec)	
		DBSL				FGL				Water Content					
		Gravel %	Gravel %	Sand %	Silt %	Clay %	Weight %	Volume %	Bulk Density (g/cm <sup>3</sup> )	Particle Density (g/cm <sup>3</sup> )	Porosity (%)	pH	Kd norm- Tol (mL/g)	CEC (meq/100g)	Org C (%)
<b>GSB-801</b>															
18.70	clayey silt	1					12.1	18.4	1.52	2.78	0.45	7.89			
21.90	sandy silt	0					23.3	38.4	1.65	2.50	0.34	7.26			
24.90	sandy silt	5					11.9	20.7	1.74	2.63	0.34	7.26			
29.50	clayey silt	2					12.8	22.8	1.78	2.53	0.30	7.74			
37.00	clayey silt	2					14.7	26.3	1.79	2.63	0.32	7.94			
42.30	clayey silt	3					13.0	24.8	1.91	2.78	0.31				
46.00	clayey silt	1					14.2	26.8	1.89	2.50	0.24				
51.50	clayey silt	1					14.6	27.0	1.85	2.70	0.31				
61.30	gravely silt	20					6.8	10.7	1.57	2.56	0.39				
65.30	slity clay	0					17.2	30.8	1.79	2.63	0.32	7.78			
2-159	slity gravel	52					6.2	11.0	1.77	2.67	0.34				
	sandy silt	0					15.6	28.2	1.81	2.78	0.35				
	clayey silt	0					9.4	14.3	1.52	2.82	0.46				
	slity/sandy/gravel	45					17.7	29.2	1.65	2.67	0.38				
	slity sand	20					8.5	13.9	1.63	2.74	0.41				
	clayey silt	0					17.9	29.7	1.66	2.56	0.35	7.27			
	sandy silt	0					16.8	26.5	1.58	2.78	0.43	7.59			
	clayey silt	0					19.2	30.0	1.56	2.67	0.42	7.30			
	sandy silt	3					15.2	27.4	1.80	2.50	0.28	7.21			
	clayey silt	6					9.1	16.2	1.78	2.63	0.32	7.18			
	slit	0					21.4	36.0	1.68	2.82	0.40				
	slity clay	0					20.8	35.2	1.69	2.64	0.36	7.28			
	<b>GSB-802</b>														
20.70	sndy/cly/silt	3	3	30	37	30	9.8	17.6	1.80	2.63	0.32	7.19		25.1	0.35
21.20	slity clay	0					13.3	24.5	1.84	2.78	0.34	7.78			
30.70	cly/silty/sand	0	3	51	27	19	8.2	12.5	1.52	2.79	0.46	7.52	0.28	25.9	0.29
31.00	slity sand	1					11.6	19.6	1.69	2.67	0.37	7.83			
35.70	slity gravel	63					3.2	5.2	1.65	2.70	0.39	7.99			

Appendix F-1. Pre-steam injection data. (Continued.)

Depth (ft)	Lithology	Data						Water Content						Kd norm-Tol (mL/g)	CEC (meq/100g)	Org C (%)	Permeability x E-07 (k=cm/sec)
		DBSL		FGL				Weight %		Volume %		Bulk Density (g/cm <sup>3</sup> )	Particle Density (g/cm <sup>3</sup> )	Porosity (%)			
		Gravel %	Gravel %	Sand %	Silt %	Clay %											
<b>GSB-802</b>																	
39.80	cly/silt/sand	0	2	45	33	19		17.7	26.8	1.51	2.50	0.40			18.1	0.25	
45.50	silty sand	5	6	61	22	12		11.8	18.6	1.58	2.78	0.43	7.36	0.23	13.5	0.20	
45.90	gravely sand																4050
49.70	sand	1	1	79	8	12		9.2	14.8	1.60	2.50	0.36	7.55	0.17	12.7	0.17	
50.40	silty sand																8880
66.90	cly/silt/sand	0	0	46	34	20		16.3	25.8	1.59	2.78	0.43	7.90	0.31	16.1	0.28	
70.80	grvly/cly/silt	23						12.4	18.5	1.49	2.56	0.42	7.45				
74.10	sity/grvly/sand	26	8	59	22	11		11.3	19.5	1.73	2.67	0.35	7.46	0.22	12.8	0.33	
78.40	sand	2	2	78	13	7		10.0	16.4	1.64	2.63	0.38	7.58	0.16	10.2	0.20	
81.50	sandy silt	1						17.3	29.6	1.71	2.78	0.38	7.49				
84.90	clayey silt																29.9
85.10	cly/silt/sand	1	1	49	32	19		17.5	29.5	1.68	2.56	0.34	7.51	0.31	15.1	0.28	
93.20	clayey silt	0						16.9	28.9	1.71	2.63	0.35	7.56				
96.00	cly/sandy/silt	0	0	40	42	18		14.7	27.0	1.84	2.63	0.30	7.58	0.54	17.7	0.25	
98.70	sand																24800
102.80	sand																24400
106.40	silty sand	11	15	47	27	11		12.8	19.8	1.55	2.67	0.42	7.91	0.14	14.1	0.20	
108.00	silty sand	15	14	46	27	14		14.2	24.0	1.69	2.63	0.36	7.83	0.12	15.0	0.24	
112.80	gravely sand	44	33	60	4	3		11.3	21.2	1.87	2.71	0.31	7.76	0.07	5.1	0.24	
113.80	sand																16200
116.60	sandy clay	1						21.1	35.6	1.69	2.70	0.37	7.80				
120.50	silty sand	0	9	49	31	11		19.1	31.7	1.66	2.78	0.40	7.68	0.27	15.9	0.27	
120.70	silty sand																126
127.60	sandy gravel	50						15.8	28.7	1.82	2.74	0.34	7.38				
133.10	gravely clay																13.3
133.50	sandy gravel	67	50	41	4	5		13.8	22.9	1.66	2.63	0.37	7.62	0.09	8.4	0.46	
135.40	gravely silt	26						19.6	32.4	1.65	2.82	0.41	7.66				
138.90	silty sand	1	1	74	18	7		19.5	33.7	1.73	2.67	0.35	7.71	0.08	16.1	0.30	

Appendix F-1. Pre-steam injection data. (Continued.)

Depth (ft)	Lithology	Data										Kd norm-Tol (mL/g)	CEC (meq/100g)	Org C (%)	Permeability × E-07 (k=cm/sec)			
		DBSL				FGL			Water Content									
		Gravel %	Gravel %	Sand %	Silt %	Clay %	Weight %	Volume %	Bulk Density (g/cm <sup>3</sup> )	Particle Density (g/cm <sup>3</sup> )	Porosity (%)	pH						
<b>GSB-802</b>																		
143.60	silty clay	0					27.4	43.9	1.60	2.67	0.40	7.82						
146.30	cly/sndy/silt	1	0	31	52	18	17.6	34.0	1.93	2.56	0.25	7.95	0.56	14.3	0.32			
<b>GSB-804</b>																		
78.30	cly/sndy/silt		0	36	39	25			1.73						0.106			
78.70	sity/sndy/clay								1.63						587			
79.60	silty sand	0					14.0	25.8	1.84	2.63	0.30	7.59						
83.30	sandy clay	0					16.6	26.8	1.69	2.57	0.34	7.40						
83.60	silty sand		0	63	22	15			1.64						228			
84.00	grvly/sndy/dty/cly								1.76						2.12			
88.70	sandy silt	13					13.8	22.9	1.66	2.71	0.39	7.23						
92.30	silty clay	0					13.1	24.2	1.85	2.63	0.30	7.51						
96.30	sandy silt	0					16.4	27.9	1.70	2.78	0.39							
98.70	sandy silt	0					15.4	25.1	1.63	2.78	0.41	7.89						
102.10	cly/grvly/sand								1.72						1930			
103.80	sandy clay	0					10.3	18.4	1.78	2.45	0.27	7.30						
106.50	sand		4	71	15	10			1.63						275			
108.20	silty clay	0					18.3	29.2	1.60	2.64	0.39							
113.80	silty clay	0					20.2	35.0	1.73	2.64	0.34							
121.20	sandy gravel	54					11.1	21.3	1.91	2.78	0.31							
129.10	cly/grvly/sand								1.85						353			
131.40	silty sand	19					12.7	24.6	1.94	2.86	0.32	7.49						
137.10	grvly/sndy/clay								1.77						1.06			
137.40	grvly/sndy/clay								1.95						0.113			
<b>GSB-805</b>																		
10.80	sandy gravel	47					3.3	5.1	1.54	2.77	0.44							
20.20	sandy clay	16					15.1	25.7	1.70	2.77	0.38	7.33						
28.60	clayey sand	0					16.8	24.2	1.44	2.50	0.42	7.47						
51.80	sndy/cly/grvl	42					14.9	26.7	1.80	2.63	0.32							

Appendix F-1. Pre-steam injection data. (Continued.)

Depth (ft)	Lithology	Data										Permeability x E-07 (k=cm/sec)	
		DBSL				FGL				Water Content			
		Gravel %	Gravel %	Sand %	Silt %	Clay %	Weight %	Volume %	Bulk Density (g/cm <sup>3</sup> )	Particle Density (g/cm <sup>3</sup> )	Porosity (%)	pH	
<b>GSB-805</b>													
53.80	silty sand	8					12.8	21.5	1.67	2.77	0.40		
59.90	silty sand	9					12.9	21.0	1.63	2.63	0.38	7.96	
63.80	silty sand	1					14.2	22.1	1.56	2.63	0.41	7.62	
71.40	silty sand	0					14.1	20.5	1.46	2.63	0.45	7.28	
77.00	sandy gravel	55					5.3	7.3	1.37	2.63	0.48	7.59	
83.60	gravelly sand	19					9.3	15.1	1.62	2.77	0.42	7.68	
90.10	sandy silt	0					17.1	30.3	1.77	2.77	0.36	7.47	
94.30	sity/sandy/grvl	48					4.7	6.9	1.47	2.77	0.47	7.68	
99.40	sandy clay	8					13.6	23.2	1.71	2.77	0.38	7.72	
105.10	sandy silt	0					15.9	27.5	1.73	2.50	0.31		
113.20	sandy silt	0					15.8	21.1	1.33	2.63	0.49	7.16	
114.80	sity/grvly/sand	31					13.1	22.7	1.73	2.63	0.34	7.51	
118.40	gravelly sand	39					11.5	19.1	1.66	2.67	0.38		
126.70	sandy clay	14					54.8	101.2	1.85	2.64	0.30	7.26	
133.80	clayey silt	0					25.8	40.4	1.56	2.63	0.41	7.60	
143.20	silty clay	1					18.9	34.0	1.79	2.70	0.34	7.76	
<b>GSB-806</b>													
53.60	cly/sndy/silt		0	39	43	18			1.81			16.5	
53.80	sandy clay								1.85			0.0508	
98.40	sand		0	69	15	16			1.64			378	
98.80	cly/sity/sand								1.64			1530	
127.20	gravelly sand		33	53	9	5			1.77			25.9	
139.10	sity cly/cly silt								1.54			18.1	
139.40	sndy/sity/clay								1.66			4.94	
<b>GSB-807</b>													
13.50	sandy gravel	36					2.5	4.1	1.64	2.63	0.38		
19.70	silty clay	14					13.5	20.3	1.50	2.56	0.41	7.56	
28.70	sandy clay	0					12.1	20.6	1.70	2.63	0.35	7.39	

**Appendix F-1. Pre-steam injection data. (Continued.)**

Depth (ft)	Lithology	Data						Water Content				Kd norm-Tot (mL/g)	CEC (meq/100g)	Org C (%)	Permeability x E-07 (k=cm/sec)
		DBSL		FGL				Weight %	Volume %	Bulk Density (g/cm <sup>3</sup> )	Particle Density (g/cm <sup>3</sup> )	Porosity (%)			
		Gravel %	Gravel %	Sand %	Silt %	Clay %									
<b>GSB-807</b>															
36.70	silty sand	2						11.8	20.9	1.77	2.63	0.33	7.19		
43.90	silty sand	4						13.7	25.2	1.84	2.78	0.34	7.40		
48.90	sandy clay	0						18.6	29.0	1.56	2.44	0.36	7.55		
54.70	sandy silt	3						18.6	30.1	1.62	2.63	0.38	7.60		
61.40	silty sand	0						18.3	29.6	1.62	2.63	0.38	7.67		
66.10	sandy clay	0						18.5	32.0	1.73	2.78	0.38	7.45		
67.20	cly/sity/sand		0	41	36	23				1.69				1.78	
67.40	sndy/sity/clay									1.67				0.244	
73.90	cly/sity/gravel	33	46	27	12	15	63	11.6	1.84	2.63	0.30	7.40		8.2	0.43
78.60	silty sand	0						18.4	25.0	1.36	2.50	0.46	7.24		
83.80	gravelly sand	31	53	43	1	3	4.8	8.3	1.72	2.78	0.38	7.19		3.8	0.16
86.80	sandy gravel		46	38	8	8				1.64					3830
87.10	grvly/cly/sand									1.80					2120
92.00	cly/sndy/grvl	73	56	22	7	15	9.9	14.6	1.47	2.78	0.47	7.23		9.5	0.20
96.80	silty sand	3						10.8	17.2	1.59	2.56	0.38	7.22		
103.90	gravelly sand	18	34	39	13	14	11.0	18.6	1.69	2.44	0.31	7.33		11.3	0.20
111.50	cly/sity/sand	2	8	34	33	25	16.7	27.6	1.65	2.50	0.34	7.14		22.4	0.19
114.40	sandy silt	1						20.4	32.2	1.58	2.63	0.40	7.24		
115.30	sity/cly/sand		0	38	27	35				1.68					3.56
115.60	sndy/sity/clay									1.70					2.07
119.50	silty sand	1	1	54	33	12	16.9	28.6	1.69	2.78	0.39	7.53		14.6	0.18
120.90	silty sand		4	57	30	9									
121.50	sandy gravel		49	37	9	5				1.88					1550
122.20	silty sand		0	76	17	7				1.57					654
126.50	cly/grvly/sand									1.90					27800
126.80	sandy gravel									1.90					0.20
128.20	sandy gravel	60	60	29	6	5	11.1	20.0	1.80	2.78	0.35	7.50		4.3	25600
134.40	grvly/sity/sand		18	40	25	17				1.89					0.405

Appendix F-1. Pre-steam injection data. (Continued.)

Depth (ft)	Lithology	Data										Kd norm-Tot (mL/g)	CEC (meq/100g)	Org C (%)	Permeability x E-07 (k=cm/sec)
		DBSL		FGL			Water Content			Bulk Density (g/cm <sup>3</sup> )	Particle Density (g/cm <sup>3</sup> )	Porosity (%)			
		Gravel %	Gravel %	Sand %	Silt %	Clay %	Weight %	Volume %							
<b>GSB-807</b>															
134.70	grvly/andy/cly									2.04					2.05
136.90	silty clay	0													
138.50	silty sand		0	56	38	6	24.8	37.2	1.50	2.56	0.41	7.24			
143.80	clayey silt	0					22.3	37.7	1.69	2.56	0.34	7.32			
148.90	silty sand	0					22.8	36.0	1.58	2.50	0.37	7.62			
<b>GSB-808</b>															
20.50	cly/sity/sand	0	1	41	35	24	13.0	23.9	1.84	2.63	0.30	7.69	0.31	19.6	0.17
25.10	silty sand	2	4	55	32	9	10.3	14.9	1.45	2.63	0.45	7.60	0.32	25.9	0.16
37.70	cly/sity/sand	0	0	35	34	32	17.6	29.7	1.69	2.56	0.34	7.40	0.55	27.9	0.15
47.00	cly/sity/sand	1	1	44	35	19	9.6	16.0	1.67	2.63	0.37	7.68	0.23	13.4	0.16
51.90	cly/sity/sand	3	1	52	26	20	15.2	26.3	1.73	2.94	0.41	7.86	0.30	26.2	0.20
60.40	andy/cly/silt	0	5	24	47	24	13.6	23.4	1.72	3.13	0.45	7.26	0.30	27.9	0.17
67.50	silty sand	0	0	63	26	12	18.4	27.8	1.51	2.78	0.46	7.54	0.18	30.9	0.19
72.80	cly/andy/gravel	62	40	29	14	17	8.3	13.6	1.64	2.38	0.31	7.79	0.18	13.7	0.15
85.70	gravely sand	11	22	59	11	8	9.0	14.4	1.60	2.78	0.42			8.5	0.16
90.80	sandy gravel	67	70	23	2	5	6.0	9.8	1.64	2.94	0.44	7.44	0.11	5.5	0.18
97.30	silty sand	0	0	78	16	6	10.0	16.2	1.62	3.13	0.48	7.93		11.5	0.09
102.50	sity/cly/sand	3	3	60	17	20	11.4	20.6	1.81	3.13	0.42	7.90		12.8	0.09
106.20	gravely sand	29	24	58	8	11	11.6	20.3	1.75	2.63	0.33	7.77	0.14	17.7	0.14
111.40	cly/andy/silt	0	0	32	46	22	18.0	30.8	1.71	2.70	0.37	7.88	0.30	23.5	0.20
119.10	cly/andy/silt	2	0	40	44	16	20.7	33.9	1.64	2.63	0.38	7.86	0.45	25.2	0.20
127.70	sandy gravel	57	76	21	3	0	11.2	22.0	1.96	2.63	0.25	7.93	0.14	4.5	0.18
128.80	sand		14	70	10	6									
138.20	silty sand		17	52	24	7									
141.00	sandy silt	0	0	38	56	6									
<b>GSB-811</b>															
10.80	sandy gravel	80					1.7	2.8	1.62	2.71	0.40	7.63			
16.10	sandy silt	0					8.0	13.9	1.74	2.63	0.34	7.77			

Appendix F-1. Pre-steam injection data. (Continued.)

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Depth (ft)	Lithology	Data										Kd norm-Tot (mL/g)	CEC (meq/100g)	Org C (%)	Permeability × E-07 (k=cm/sec)				
		DBSL					FGL												
		Gravel %	Gravel %	Sand %	Slit %	Clay %	Weight %	Volume %	Bulk Density (g/cm <sup>3</sup> )	Particle Density (g/cm <sup>3</sup> )	Porosity (%)								
<b>GSB-811</b>																			
21.20	sandy clay	0					13.4	24.0	1.79	2.51	0.29	7.92							
26.50	clayey sand	7					10.6	18.0	1.70	2.50	0.32	7.29							
33.80	silty sand	1					8.9	17.3	1.94			7.87							
36.80	clayey silt	0					15.1	24.2	1.60										
43.40	silty sand	7					7.4	12.2	1.65			7.99							
51.80	sandy gravel	73					3.4	6.7	1.94	2.63	0.26								
63.10	sand	0					7.6	14.4	1.89	2.74	0.31	7.69							
71.60	gravelly sand	1					14.1	22.0	1.57	2.63	0.40	7.19							
81.20	sandy gravel	76					2.4	4.8	2.01			7.98							
92.00	silty clay	0					18.9	39.3	2.08	2.53	0.18	7.16							
98.30	sand	48					5.2	8.5	1.65	2.63	0.37	7.42							
107.00	silty clay	0					15.3	34.7	2.27	2.50	0.09	7.99							
109.80	sandy clay	1					15.4	34.5	2.24			7.70							
114.40	silty sand	2					15.8	21.9	1.39	2.50	0.44	7.30							
126.30	sandy silt	14					12.0	24.3	2.03			7.47							
134.00	clayey silt	0					24.8	38.2	1.54	2.56	0.40	7.12							
137.40	silty clay	0					22.5	34.4	1.53	2.78	0.45	7.95							
<b>TEP-GP-001</b>																			
12.40	clayey silt	13					10.7	15.9	1.49	2.70	0.45								
19.50	clayey silt	0					13.3	21.9	1.65	2.50	0.34								
30.60	clayey silt	0					11.2	17.9	1.60	2.56	0.38								
31.70	grvly/sandy/silt	16					6.2	10.5	1.69	2.70	0.37								
42.10	sandy silt	0					16.2	26.9	1.66	2.56	0.35								
58.20	sandy silt	0					11.2	20.4	1.82	2.78	0.35								
60.90	sand	0					3.8	5.6	1.47	2.70	0.46								
66.10	silty sand	9					3.1	4.7	1.51	2.78	0.46								
71.30	silty/sandy/gravel	55					6.4	11.2	1.75	2.63	0.33								
74.10	sandy silt	0					17.4	24.9	1.43	2.70	0.47								

Appendix F-1. Pre-steam injection data. (Continued.)

Depth (ft)	Lithology	Data										Permeability × E-07 (k=cm/sec)				
		DBSL		FGL			Water Content		Bulk Density (g/cm <sup>3</sup> )	Particle Density (g/cm <sup>3</sup> )	Porosity (%)	pH	Kd norm- Tol (mL/g)	CEC (meq/100g)	Org C (%)	
		Gravel %	Gravel %	Sand %	Silt %	Clay %	Weight %	Volume %								
<b>TEP-GP-001</b>																
75.60	clayey sand													2580		
78.50	grvly/sndy/clay													0.429		
82.00	clayey silt	13					12.5	21.9	1.75	2.63	0.33				8.84	
85.60	grvly/sndy/clay															
91.70	sandy silt	0					19.4	33.4	1.72	2.63	0.35					
94.10	silty sand	0					12.2	19.3	1.58	2.63	0.40					
101.70	sandy clay													526		
105.60	clayey silt	0					17.3	27.2	1.57	2.63	0.40					
106.30	cly/sity/sand													121		
117.90	sity/grvly/sand	47					11.6	22.6	1.95	2.63	0.26					
<b>TEP-GP-003</b>																
10.80	sandy silt	6					5.2	7.9	1.52	2.70	0.44					
21.00	sandy silt	0					16.3	27.7	1.70	2.50	0.32					
22.70	sandy silt	0					6.1	9.7	1.59	2.78	0.43					
44.50	clayey silt	0					17.5	29.1	1.66	2.63	0.37					
49.20	clayey silt	2					15.4	28.5	1.85	2.63	0.30					
61.70	grvly/sndy/silt	16					12.0	21.0	1.75	2.70	0.35					
65.60	sandy silt	0					17.6	27.6	1.57	2.78	0.44					
71.40	sand	0					9.3	14.4	1.55	2.78	0.44					
72.90	silty clay	1					17.4	31.3	1.80	2.63	0.32					
80.50	sandy silt	1					14.3	21.9	1.53	2.56	0.40					
85.80	silty sand	0					7.0	10.4	1.48	2.78	0.47					
90.80	gravely silt	1					14.8	24.7	1.67	2.56	0.35					
96.50	sandy silt	0					21.3	34.1	1.60	2.63	0.39					
109.20	sandy silt	1					15.5	27.3	1.76							
112.80	clayey silt	0					17.5	29.6	1.69	2.56	0.34	7.17				
116.50	clayey silt	0					18.4	32.8	1.78	2.50	0.29	7.18				
120.90	sandy silt	0					18.9	33.3	1.76	2.56	0.31	7.26				

Appendix F-1. Pre-steam injection data. (Continued.)

Depth (ft)	Lithology	Data										Kd norm-Tol (mL/g)	CEC (meq/100g)	Org C (%)	Permeability × E-07 (k=cm/sec)				
		DBSL					FGL												
		Gravel %	Gravel %	Sand %	Slit %	Clay %	Weight %	Volume %	Bulk Density (g/cm <sup>3</sup> )	Particle Density (g/cm <sup>3</sup> )	Porosity (%)								
<b>TEP-GP-003</b>																			
122.00	clayey silt	0					17.3	29.9	1.73	2.85	0.39	7.19							
131.20	silty/sandy/gravel	43					12.3	22.4	1.82	2.63	0.31	7.36							
135.10	sandy silt	0					23.3	38.9	1.67	2.78	0.40	7.27							
142.30	clayey silt	0					20.6	35.4	1.72	2.63	0.35	7.16							
146.00	silty clay	0					22.9	37.6	1.64	2.78	0.41	7.57							
150.00	silty clay	0					19.9	35.0	1.76	2.78	0.37	7.42							
157.30	clayey silt	0					20.9	34.9	1.67	2.63	0.37	7.65							
<b>TEP-GP-008</b>																			
18.70	sndy/cly/silt	0	0	26	41	34	16.6	28.4	1.71	2.63	0.35	7.08	0.34	19.6	0.30				
32.70	silty sand	0	10	62	17	12	8.2	13.3	1.62	2.63	0.38	7.49	0.11	13.0	0.22				
39.40	cly/sndy/silt	0	1	32	36	31	15.7	27.2	1.73	2.63	0.34	7.59	0.32	24.6	0.24				
44.90	sndy/silt/clay	25	11	24	30	36	16.7	27.2	1.63	2.50	0.35	7.77		34.1	0.27				
51.10	sndy/cly/silt	0	0	27	42	31	15.2	23.0	1.51	2.70	0.44	7.54	0.28	22.7	0.28				
60.90	cly/sndy/sand	0	0	38	37	25	17.7	29.7	1.68	2.78	0.40	7.77	0.30	20.7	0.21				
72.00	cly/sndy/sand	4	0	40	35	25	14.3	26.0	1.82	2.63	0.31	7.94	0.42	18.0	0.27				
79.60	silty sand	0	0	53	32	15	16.1	26.6	1.65	2.78	0.41	7.98		13.8	0.22				
91.70	cly/sndy/sand	0	0	53	31	16	12.6	22.3	1.77	2.63	0.33	7.84		14.8	0.19				
95.20	silty/cly/grvly/snd	32	19	46	17	18	9.0	15.8	1.76	2.50	0.30	7.93	0.16	10.7	0.20				
105.30	grvly/cly/sity/snd	22	15	50	18	17	13.4	24.4	1.82	2.63	0.31	7.99	0.22	15.8	0.22				
118.60	cly/sndy/sand	0	0	57	28	15	19.2	32.6	1.70	2.63	0.35	7.69	0.35	15.1	0.22				
131.40	sandy gravel	33	62	18	9	11	13.6	25.7	1.89	2.78	0.32	7.83		6.6	0.17				
137.70	cly/sndy/silt	0	0	23	59	18	26.1	40.2	1.54	2.56	0.40	7.39	0.41	23.0	0.29				
142.00	clayey silt	0	0	10	66	24	26.5	41.1	1.55	2.56	0.39	7.41		21.0	0.31				
152.20	cly/sndy/silt	0	0	37	44	19	17.7	32.2	1.82	2.70	0.33	7.04	0.40	13.9	0.38				
<b>TEP-GP-010</b>																			
22.90	sandy silt	0					17.1	28.7	1.68	2.56	0.34								
31.80	sandy silt	8					12.6	21.8	1.73	2.70	0.36	7.49							
41.30	sity/grvly/sand	28					6.9	10.8	1.57	2.50	0.37	7.63							

**Appendix F-1. Pre-steam injection data. (Continued.)**

Depth (ft)	Lithology	Data					Water Content			Bulk Density (g/cm <sup>3</sup> )	Particle Density (g/cm <sup>3</sup> )	Porosity (%)	pH	Kd norm- Tol (mL/g)	CEC (meq/100g)	Org C (%)	Permeability × E-07 (k=cm/sec)
		DBSL	FGL				Weight %	Volume %									
<b>TEP-GP-010</b>																	
46.60	sandy silt	0					19.8	31.5	1.59	2.86	0.44	7.61					
51.70	clayey silt	5					13.4	24.4	1.82	2.50	0.27	7.97					
60.60	sandy silt	0					13.7	22.5	1.64	2.78	0.41	7.74					
64.20	sand	9					6.1			2.63		7.96					
71.10	silty sand	0					13.0	20.3	1.56	2.78	0.44	7.65					
77.80	clayey silt	0					15.9	27.3	1.72	2.78	0.38	7.79					
83.00	clayey silt	2					14.9	26.8	1.80	2.78	0.35	7.83					
88.10	silty gravel	58					9.6	15.2	1.58	2.70	0.41	7.66					
92.90	clayey silt	0					16.1	28.2	1.75	2.78	0.37	7.91					
99.10	sity/sndy/gravel	56					8.6	13.6	1.58	2.63	0.40	7.69					
107.50	sandy silt	0					16.4	28.5	1.74	2.94	0.41	7.81					
116.50	sandy silt	0					18.6	30.5	1.64	2.50	0.34	7.78					
123.40	sity/grvly/sand	25					10.6	20.2	1.91	2.78	0.31						
131.70	grvly/cly/silt	16					13.4	25.1	1.87	2.78	0.33	7.79					
143.50	silty clay	0					18.3	32.8	1.79	2.94	0.39	7.90					
148.80	clayey silt	0					23.9	39.7	1.66	2.85	0.42	7.86					
159.80	clayey silt	0					17.8	31.5	1.77	2.85	0.38	7.77					

\* Porosity data calculated using average particle density of 2.65 g/cc.

\*\* sandy clay with sandstone fragments

Table F-2. Post-steam injection data.

Depth (ft)	Temperature (°C) ***	Lithology	Data				Water Content				Kd norm-Tol (mL/g)	CEC (meq/100g)	Org C (%)	Permeability × E-07 (k-cm/sec)		
			DBSL	FGL			Weight %	Volume %	Bulk Density (g/cm³)	Particle Density (g/cm³)	Porosity (%)					
<b>HW-GP-102</b>																
75.60	40	cly/mty/sand	3	8	55	22	16	13.9	25.9	1.86	2.63	0.29	7.08	0.06	14.5	0.04
80.35	50	sandy silt	0					19.3	35.3	1.83	2.78	0.34	7.22			23.8
80.60	50	silty/muddy/clay														
85.25	54	silty sand	1					13.4	23.6	1.76	2.70	0.35	7.35			
90.25	78	cly/muddy/silt	0	0	34	40	26	14.6	22.0	1.51	2.63	0.43	7.24	0.40	19.0	0.07
90.50	78	silty/muddy/clay														39.1
95.35	84	silty sand	1								2.78			7.15		
99.85	80	silty sand	1	3	57	26	14	17.8	25.6	1.44	2.63	0.45	7.17	0.15	16.0	0.02
100.10	80	silty/cly/sand														529
108.20	96	cly/mty/sand														416
108.50	96	sand	0					18.7			2.70			7.40		
111.50	86	gravelly sand	40	41	54	2	4	13.1	21.6	1.65	2.78	0.41	7.01		6.5	0.01
115.70	91	silty/cly/sand	2	3	42	24	31	15.8	26.4	1.67	2.50	0.33	7.07	0.28	22.1	0.06
121.80	89	grvly/mty/mdy/cly														1.15
130.90	58	sandy gravel	47	58	37	3	3	11.2	18.3	1.63	2.63	0.38	7.65		4.0	0.03
131.10	58	grvly/mdy/cly														14.4
<b>HW-GP-103</b>																28300
80.35	65	grvly/mty/sand														
80.60	65	sand	5	10	75	7	8	10.1	15.8	1.56	2.77	0.44		0.09	9.2	0.02
84.20	68	gravelly sand	26					5.8	9.7	1.68	2.94	0.43		0.11		2.99
91.00	78	grvly/mdy/clay														
91.90	78	cly/mty/sand	0	1	47	29	24	13.3	22.1	1.66	2.77	0.40		0.23	18.4	<0.01
96.00	76	sand	0					12.6	20.8	1.65	2.77	0.40		0.07		
101.20	69	sandy gravel	31	74	17	4	5	7.8	13.6	1.74	2.70	0.36	7.03	0.03	4.8	0.02
102.70	72	sandy silt	1					14.7	25.9	1.76	2.63	0.33	7.15	0.11		
110.00	71	cly/mty/sand	0	1	49	31	20	19.1	29.2	1.53	2.77	0.45	7.12	0.20	17.7	0.03
111.50	71	sandy/mty/clay														2.79
116.00	70	silty sand	0					17.6	28.3	1.61	2.70	0.40	7.23	0.11		

Table F-2. Post-steam injection data. (Continued.)

Depth (ft)	Temperature (°C)***	Lithology	Data												Permeability × E-07 (k=cm/sec)	
			DBSL				FGL				Water Content					
			Gravel %	Gravel %	Sand %,	Silt %	Clay %	Weight %	Volume %	Bulk Density (g/cm <sup>3</sup> )	Particle Density (g/cm <sup>3</sup> )	Porosity (%)	pH	Kd norm- Tol (mL/g)	CEC (meq/100g)	Org C (%)
<b>HW-GP-103</b>																
120.00		silty/sandy/clay														43.4
127.50	67	gravelly sand	9	25	61	5	10	14.8	24.3	1.64	2.63	0.38	7.38	0.21	10.0	0.03
128.25	67	grvly/sandy/clay														8.5
<b>HW-GP-104</b>																
75.65	90	silty sand	0					13.3	23.3	1.76	2.67	0.34	7.15	0.11		
81.25	92	grvly/sandy/clay														7.45
81.50	92	sandy gravel	47	57	38	2	4	5.9	10.7	1.81	2.78	0.35	7.13			
86.70	94	sandy gravel	50					5.9	9.6	1.62	2.56	0.37	7.30	0.01		
91.55	90	sandy gravel	73	69	22	1	8	5.3	9.9	1.86	2.63	0.29	7.00	0.04	5.8	0.02
91.80	90	grvly/sandy/clay														42.7
96.50	92	silty sand	2					9.5	18.1	1.91	2.70	0.29	7.34	0.18		
106.25	90	grvly/sandy/clay														27.2
106.50	90	sity/cly/sand	5	11	35	25	30	9.4	17.7	1.88	2.63	0.28	7.51	0.11	17.3	0.05
111.25	83	silty sand	1						18.1	29.4	1.62	2.78	0.42	7.29		
116.25		silty sand	1	1	45	36	19	19.0	29.6	1.56	2.74	0.43		0.12	19.8	0.03
131.25		grvly/cly/sity/snd	13	17	42	20	21	12.3	22.4	1.83	2.78	0.34	7.45	0.14	11.6	0.04
<b>GSB-910</b>																
78.70		cly/sity/sand	1	3	56	21	21	15.6	27.6	1.78	2.74	0.35	7.43	0.07	17.6	0.22
80.50	83	silty sand	60					5.4			2.82		7.68	0.10		
80.75	83	grvly/cly/sand														2160
86.25	64	sandy gravel	80	61	32	2	4	5.2	10.0	1.91	2.74	0.30	7.37	0.07	4.8	0.18
91.25	64	sandy gravel	63					6.5	13.1	2.03	2.70	0.25	7.33	0.14		
95.25	66	sity/cly/sand	0	0	65	16	19	13.9	20.2	1.46	2.70	0.46	7.38	0.08	14.7	0.15
100.35	50	sandy clay														22.3
100.85	50	silty sand	0													
107.30		sandy/sity/clay														1.69
107.50		cly/sandy/silt	0	1	35	36	29	16.3	28.2	1.73	2.63	0.34	7.28	0.38	22.3	0.14
116.60	37	sandy/sity/clay														5.54

Table F-2. Post-steam injection data. (Continued.)

Depth (ft)	Temperature (°C) ***	Lithology	Data												Permeability × E-07 (k=cm/sec)	
			DBSL				FGL				Water Content					
			Gravel %	Gravel %	Sand %	Slit %	Clay %	Weight %	Volume %	Bulk Density (g/cm³)	Particle Density (g/cm³)	Porosity (%)	pH	Kd norm-Tol (mL/g)	CEC (meq/100g)	Org C (%)
<b>GSB-910</b>																
116.80	37	cly/sity/sand	0	1	45	28	27	18.2	30.3	1.67	2.67	0.37	7.22	0.24	20.1	0.20
118.50		silty sand	0					19.2	32.5	1.70	2.60	0.35	7.40	0.49		
124.10		sandy/sity/clay														0.877
124.40	26	cly/sandy/silt	0	0	27	48	25	19.0	32.0	1.69	2.63	0.36	7.35	0.14	20.6	0.18
130.75	29	silty sand	11	13	58	17	11	18.4	31.6	1.72	2.81	0.39	7.62	0.08	10.7	0.30
<b>HW-GP-105</b>																
74.30		muddy clay														25.7
76.75	86	cly/sity/sand	0	1	50	28	21	14.9	25.2	1.70	2.67	0.36	7.02	0.48	17.5	0.15
81.25		cly/grvly/sand														25.5
82.25	96	gravelly sand	63					4.2	8.0	1.92	2.70	0.29	7.01			
84.75	88	gravel	68	76	15	4	5	4.7	9.3	2.00	2.67	0.25	7.06	0.07	2.1	0.23
91.25		grvly/sandy/clay														12.5
92.25	90	sandy gravel	47	61	26	4	9	8.8	16.1	1.83	2.74	0.33	6.88	0.07	6.9	0.28
96.60	91	gravelly sand	7					9.4	16.2	1.72	2.78	0.38	7.20			
101.05		sity/sandy/clay														0.39
102.05	91	sandy gravel	46	59	29	2	10	9.4	17.0	1.80	2.60	0.31	6.99	0.06	7.1	0.23
105.15	91	sandy gravel	39					10.0	18.4	1.85	2.78	0.33	6.86			
109.85	88	silty sand	0					19.1	31.7	1.66	2.70	0.39	6.86			
111.55		sandy/sity/clay														8.38
112.55	80	silty sand	16	12	58	18	12	15.7	27.7	1.76	2.56	0.31	6.91	0.10	15.5	0.19
117.45	73	silty sand	11					19.3	31.3	1.62	2.56	0.37	7.00			
121.30	68	silty sand	0	14	57	17	12	23.6	35.7	1.51	2.60	0.42	7.20	0.27	12.3	0.11
121.80		sity/sandy/clay														6.05
126.20	56	gravelly sand	53					12.0	25.4	2.11	2.74	0.23	7.17			
132.25		cly/sity/sand	23	11	43	23	23	13.4	25.2	1.87	2.67	0.30	7.07	0.27	14.2	0.18
<b>TEP-GP-106</b>																
76.75	90	cly/sity/sand	1	1	59	22	18	14.2	21.1	1.49	2.70	0.45	7.15	0.22	20.3	0.16
81.00	99	silty sand	0					16.8	25.9	1.54	2.67	0.42		0.05		

Table F-2. Post-steam injection data. (Continued.)

Depth (ft)	Temperature (°C)***	Lithology	Data										Permeability × E-07 (k=cm/sec)			
			DBSL		FGL		Water Content		Bulk Density (g/cm <sup>3</sup> )	Particle Density (g/cm <sup>3</sup> )	Porosity (%)	Kd norm- Tol (mL/g)	CEC (meq/100g)			
<b>TEP-GP-106</b>																
82.25		silty/muddy/clay												6.9		
88.00		silty/clay/sand	0	4	34	29	34	15.0	26.8	1.79	2.70	0.34	7.02	24.3	0.12	
93.35		gravelly/muddy/clay												0.0856		
94.10	88	silty sand	0					14.0	24.9	1.79	2.63	0.32		0.10		
96.35	100	clay/silty/sand	0	1	44	31	24	16.8	28.3	1.69	2.60	0.35		0.22	20.0	0.15
101.00		silty sand	31					8.2	16.2	1.97	2.63	0.25	7.45	0.07		
107.25		gravelly sand	40	31	52	8	10	10.3	20.9	2.03	2.63	0.23		0.06	11.4	0.26
107.80	98	gravelly/dry/sand						15.4	27.4	1.78	2.60	0.32		0.30		33.3
109.85		silty sand	2													
115.10	88	silty/muddy/clay														4.44
115.85		clay/muddy/silt	0	1	39	44	17	16.5	28.1	1.70	2.63	0.35		0.25	24.4	0.21
127.90		gravelly/dry/sand														5.05
129.20		sandy gravel	78	62	31	4	4	10.3	19.4	1.87	2.78	0.33	7.84	0.02	4.0	0.34
131.25	48	silty sand	11					12.2	23.0	1.88	2.78	0.32	7.20	0.07		

\* porosity data calculated using average particle density of 2.65 g/cc

\*\* sandy clay with sandstone fragment

\*\*\* average subsurface temperature in pre-steamed boreholes from baseline instruments is 18° C.

## **Appendix G**

### **Soil Organic Chemistry Data**

**Appendix G. Soil organic chemistry data spreadsheet.**

Location ID Borehole	Depth (ft)	Benzene (mg/kg)	Ethylbenzene (mg/kg)	Toluene (mg/kg)	Total Xylene (mg/kg)	Total BTEX (mg/kg)	Gasoline Fingerprint (mg/kg)	Gasoline Fingerprint (ug/L)
GSB-710	4.5	ND	ND	ND	ND	0		
GSB-710	16.2	ND	ND	ND	ND	0		
GSB-710	29.3	ND	ND	ND	ND	0		
GSB-710	40.7	ND	ND	0	ND	0		
GSB-710	53.4	ND	ND	ND	ND	0		
GSB-710	66.8	ND	ND	ND	ND	0		
GSB-710	77	ND	ND	ND	ND	0		
GSB-710	97.2	0.17	ND	ND	0.05	0.22	0.4	
GSB-710	100.8	0.06	0.01	0	0.03	0.1	0.8	
GSB-710	102.8	ND	ND	ND	ND	0	ND	
GSB-710	115.3	0.14	0.02	0.07	0.11	0.34	0.8	
GSB-710	122.3	ND	4	ND	18	22	300	
GSB-710	134	ND	ND	ND	ND	0	ND	
GSB-710	137.5	ND	ND	ND	ND	0	ND	
GSB-711	11.8	ND	ND	0	ND	0		
GSB-711	19	ND	ND	ND	ND	0		
GSB-711	27.3	ND	ND	0	ND	0		
GSB-711	39.3	ND	ND	ND	ND	0		
GSB-711	51	ND	ND	ND	ND	0		
GSB-711	59.8	ND	ND	ND	ND	0		
GSB-711	64.8	ND	ND	ND	ND	0		ND
GSB-711	73.3	ND	ND	ND	ND	0		ND
GSB-711	88	ND	ND	ND	ND	0		ND
GSB-711	93.5	14	26	100	140	280	1300	
GSB-711	99.9	0.2	0.04	0.27	0.25	0.76	4.5	
GSB-711	100.3	240	260	1000	1300	2800	11000	
GSB-711	109.9	1.2	0.08	1.4	1.1	3.78	15	
GSB-711	112.8	1	0.5	2	2.9	6.4	ND	
GSB-711	119.3	2	2	9	13	26	140	
GSB-711	119.8	0.54	0.7	5.8	3.5	10.54	43	
GSB-711	123.3	1.4	0.4	2.3	2.1	6.2	23	
GSB-711	139.6	0.01	0.01	0.02	0.04	0.08	1.5	
GSB-801	10.1	ND	ND	ND	ND	0	ND	
GSB-801	16.5	ND	ND	ND	ND	0	ND	
GSB-801	20.9	ND	ND	ND	ND	0	ND	
GSB-801	24.2	ND	ND	ND	ND	0	ND	
GSB-801	28.4	ND	ND	ND	ND	0	ND	
GSB-801	35	ND	ND	ND	ND	0	ND	
GSB-801	39.8	ND	ND	ND	ND	0	ND	

**Appendix G. Soil organic chemistry data spreadsheet. (Continued).**

Location ID Borehole	Depth (ft)	Benzene (mg/kg)	Ethylbenzene (mg/kg)	Toluene (mg/kg)	Total Xylene (mg/kg)	Total BTEX (mg/kg)	Gasoline Fingerprint (mg/kg)	Gasoline Fingerprint (ug/L)
GSB-801	44.8	ND	ND	ND	ND	0	ND	
GSB-801	50.4	ND	ND	ND	ND	0	ND	
GSB-801	58	ND	ND	ND	ND	0	ND	
GSB-801	58.4	ND	ND	ND	ND	0	ND	
GSB-801	62.7	ND	ND	ND	ND	0	ND	
GSB-801	64.3	ND	ND	ND	ND	0	ND	
GSB-801	67.4	ND	ND	ND	ND	0	ND	
GSB-801	68	ND	ND	ND	ND	0	ND	
GSB-801	70	ND	ND	ND	ND	0	ND	
GSB-801	76	ND	ND	ND	ND	0	ND	
GSB-801	80.7	ND	ND	ND	ND	0	ND	
GSB-801	85.3	ND	ND	ND	ND	0	ND	
GSB-801	89.3	ND	ND	ND	ND	0	ND	
GSB-801	95.7	ND	ND	ND	ND	0	ND	
GSB-801	98.9	ND	ND	ND	0.01	0.01	15	
GSB-801	99.4	ND	ND	ND	ND	0	ND	
GSB-801	101.4	0.02	0	0.03	0.03	0.08	0.6	
GSB-801	105	3.5	8.3	22	56	89.8	560	
GSB-801	111	0	ND	0.01	0	0.01	0.4	
GSB-801	116	0.21	ND	0.13	ND	0.34	ND	
GSB-801	119.3	8.6	19	41	121	189.6	1500	
GSB-801	122	2.7	3	9.8	19.7	35.2	170	
GSB-801	128	ND	ND	0	ND	0	ND	
GSB-801	133.8	0	ND	0	0	0	0.5	
GSB-801	139.1	ND	ND	ND	ND	0	ND	
GSB-801	142	0	ND	0.01	0.02	0.03	2.9	
GSB-802	10.1	ND	ND	ND	ND	0	ND	
GSB-802	20	ND	ND	ND	ND	0	ND	
GSB-802	22.9	ND	ND	ND	ND	0	ND	
GSB-802	30	ND	ND	ND	ND	0	ND	
GSB-802	31.9	ND	ND	ND	ND	0	ND	
GSB-802	39.2	ND	ND	ND	ND	0	ND	
GSB-802	45	ND	ND	ND	ND	0	ND	
GSB-802	49.1	ND	ND	ND	ND	0	ND	
GSB-802	55.8	ND	ND	ND	ND	0	ND	
GSB-802	65.3	ND	ND	ND	ND	0	ND	
GSB-802	65.6	ND	ND	ND	ND	0	ND	
GSB-802	71.2	ND	ND	ND	ND	0	ND	
GSB-802	73	ND	ND	0	0	0	ND	
GSB-802	76.9	ND	ND	ND	ND	0	ND	
GSB-802	80.3	ND	ND	ND	ND	0	ND	

**Appendix G. Soil organic chemistry data spreadsheet. (Continued).**

Location ID Borehole	Depth (ft)	Benzene (mg/kg)	Ethylbenzene (mg/kg)	Toluene (mg/kg)	Total Xylene (mg/kg)	Total BTEX (mg/kg)	Gasoline Fingerprint (mg/kg)	Gasoline Fingerprint (ug/L)
GSB-802	84.2	ND	ND	ND	ND	0	ND	
GSB-802	85.9	ND	ND	ND	ND	0	ND	
GSB-802	92.1	ND	ND	ND	ND	0	ND	
GSB-802	95	0.2	0.01	0.05	0.05	0.31	1.3	
GSB-802	98.1	0	ND	0	ND	0	ND	
GSB-802	99.6	0.01	ND	0.01	ND	0.02	ND	
GSB-802	102.2	3	2	8	11	24	720	
GSB-802	105.4	1.4	3	5.6	16.1	26.1	140	
GSB-802	106.8	11	24	77	106	218	1000	
GSB-802	109	4	3.3	13	15.6	35.9	130	
GSB-802	111	20	27	71	143	261	1400	
GSB-802	113	11	19	56	86	172	540	
GSB-802	116.3	7	29	54	150	240	1200	
GSB-802	119.8	3	8	22	36	69	380	
GSB-802	122.5	2.5	0.6	3.4	3	9.5	18	
GSB-802	124	0.5	0.04	0.37	0.31	1.22	4.7	
GSB-802	124.8	0.16	0.02	0.09	0.12	0.39	1	
GSB-802	130.8	0.5	0.5	1.3	3.4	5.7	25	
GSB-802	133.7	ND	ND	ND	ND	0	0.5	
GSB-802	134.6	0.01	ND	0.01	0.02	0.04	ND	
GSB-802	137.1	0.01	ND	0.01	0	0.02	ND	
GSB-802	141.7	0	ND	0.01	0.01	0.02	ND	
GSB-802	142.2	0.02	0.01	0.05	0.06	0.14	ND	
GSB-802	144.9	0	ND	0.01	0.01	0.02	0.6	
GSB-803	89	ND	ND	ND	ND	0	ND	
GSB-803	94	ND	ND	ND	ND	0	ND	
GSB-803	98.7	0.01	ND	0.02	0.01	0.04	ND	
GSB-803	102.2	0.6	0.16	0.8	0.89	2.45	17	
GSB-803	109.9	0.68	0.07	0.2	0.35	1.3	3.3	
GSB-803	112	2.3	2.6	6.6	13	24.5	110	
GSB-803	115.8	140	160	460	700	1460	6700	
GSB-803	116.2	2.9	1.2	4.9	6.3	15.3	65	
GSB-803	120.8	110	100	340	520	1070	1500	
GSB-803	123.8	7.4	9.2	32	64	112.6	800	
GSB-803	129.1	0.03	ND	0.01	ND	0.04	0.6	
GSB-803	134	0.01	ND	0.03	0.02	0.06	0.8	
GSB-803	137	ND	ND	ND	ND	0	ND	
GSB-803	139.7	0.01	ND	0.01	ND	0.02	ND	
GSB-803	144	0.03	ND	0.03	0.01	0.07	ND	
GSB-803	144.6	0.01	ND	0.02	0.01	0.04	ND	
GSB-803	148	ND	ND	ND	ND	0	ND	

**Appendix G. Soil organic chemistry data spreadsheet. (Continued).**

Location ID Borehole	Depth (ft)	Benzene (mg/kg)	Ethylbenzene (mg/kg)	Toluene (mg/kg)	Total Xylene (mg/kg)	Total BTEX (mg/kg)	Gasoline Fingerprint (mg/kg)	Gasoline Fingerprint (ug/L)
GSB-804	3	ND	ND	ND	ND	0	ND	
GSB-804	5.2	ND	ND	ND	ND	0	ND	
GSB-804	12.1	ND	ND	ND	ND	0	ND	
GSB-804	16.1	ND	ND	ND	ND	0	ND	
GSB-804	19.7	ND	ND	ND	ND	0	ND	
GSB-804	22.2	ND	ND	ND	ND	0	ND	
GSB-804	29.9	ND	ND	ND	ND	0	ND	
GSB-804	37.4	ND	ND	ND	ND	0	ND	
GSB-804	39.8	ND	ND	ND	ND	0	ND	
GSB-804	44.7	ND	ND	ND	ND	0	ND	
GSB-804	45.7	ND	ND	ND	ND	0	ND	
GSB-804	50.8	ND	ND	ND	ND	0	ND	
GSB-804	53.7	ND	ND	ND	ND	0	ND	
GSB-804	55.5	ND	ND	ND	ND	0	ND	
GSB-804	58.4	ND	ND	ND	ND	0	ND	
GSB-804	63.5	ND	ND	ND	ND	0	ND	
GSB-804	67.7	ND	ND	ND	ND	0	ND	
GSB-804	68	ND	ND	ND	ND	0	ND	
GSB-804	72.2	ND	ND	ND	ND	0	ND	
GSB-804	77.2	ND	ND	ND	ND	0	ND	
GSB-804	79.2	ND	ND	ND	ND	0	ND	
GSB-804	84.7	ND	ND	ND	ND	0	ND	
GSB-804	88.9	ND	ND	ND	ND	0	ND	
GSB-804	93.7	0.01	ND	ND	ND	0.01	ND	
GSB-804	98	0.02	ND	ND	ND	0.02	ND	
GSB-804	99.8	ND	ND	ND	ND	0	ND	
GSB-804	101.2	ND	ND	ND	ND	0	ND	
GSB-804	105	0.01	ND	ND	ND	0.01	ND	
GSB-804	110.2	0.03	ND	ND	0.01	0.04	ND	
GSB-804	114.2	ND	ND	ND	ND	0	ND	
GSB-804	119.6	0.02	ND	0	0.01	0.03	0.6	
GSB-804	120.7	0.85	0.3	1.1	1.7	3.95	14	
GSB-804	125	ND	ND	0	0	0	1.9	
GSB-804	132.4	ND	ND	ND	ND	0	ND	
GSB-804	137.7	ND	ND	ND	ND	0	ND	
GSB-804	139.7	ND	ND	ND	ND	0	ND	
GSB-804	144.3	ND	ND	ND	ND	0	ND	
GSB-805	113.6	ND	ND	ND	ND	0	ND	
GSB-805	114.1	0.01	ND	ND	ND	0.01	ND	
GSB-805	118.7	1.4	7.3	16	42	66.7	390	
GSB-805	121.7	0.78	0.43	0.81	2.18	4.2	30	

**Appendix G. Soil organic chemistry data spreadsheet. (Continued).**

Location ID Borehole	Depth (ft)	Benzene (mg/kg)	Ethylbenzene (mg/kg)	Toluene (mg/kg)	Total Xylene (mg/kg)	Total BTEX (mg/kg)	Gasoline Fingerprint (mg/kg)	Gasoline Fingerprint (ug/L)
GSB-805	129.9	0.16	0.14	0.34	0.86	1.5	17	
GSB-805	138.4	ND	ND	ND	ND	0	ND	
GSB-805	144.1	0	ND	0.02	0.02	0.04	0.6	
GSB-805	148.4	ND	ND	ND	ND	0	ND	
GSB-806	61.2	ND	ND	ND	ND	0	ND	
GSB-806	128	1	2.2	5.3	12.2	20.7	120	
GSB-806	135.2	ND	ND	ND	ND	0	ND	
GSB-806	139.7	0.01	0.01	0.03	0.03	0.08	3.4	
GSB-807	31.3	ND	ND	ND	ND	0	0.4	
GSB-807	36.4	ND	ND	ND	ND	0	2.6	
GSB-807	39.2	ND	0.01	ND	0.29	0.3	250	
GSB-807	41.5	ND	2.2	3.2	13	18.4	180	
GSB-807	47.2	ND	0	ND	0.22	0.22	170	
GSB-807	72	ND	ND	0	0.03	0.03	13	
GSB-807	75	ND	25	43	163	231	900	
GSB-807	79.2	ND	63	110	567	740	3700	
GSB-807	80.9	ND	1.1	0.5	27	28.6	1300	
GSB-807	89	ND	13	14	126	153	900	
GSB-807	95.2	16	49	170	250	485	2700	
GSB-807	97.3	17	36	130	200	383	2000	
GSB-807	104.6	0.26	ND	0.36	0.13	0.75	7.4	
GSB-807	110.8	49	58	210	334	651	3000	
GSB-807	113.5	63	68	370	480	981	2900	
GSB-807	118.4	20	26	90	141	277	1400	
GSB-807	121.8	0.66	0.27	0.76	1.6	3.29	25	
GSB-807	123	24	28	87	168	307	1200	
GSB-807	125.8	0.19	0.22	0.62	1.26	2.29	12	
GSB-807	131.6	0	ND	0	ND	0	2.8	
GSB-807	135	0.03	ND	0.04	0.04	0.11	12	
GSB-807	139.8	0.01	ND	0.02	0.01	0.04	12	
GSB-807	144.8	ND	ND	ND	ND	0	0.4	
GSB-807	149.8	0.42	0.49	1.4	2.76	5.07	31	
GSB-808	6.7	ND	ND	ND	ND	0	ND	
GSB-808	13.4	ND	ND	ND	ND	0	ND	
GSB-808	19.1	ND	ND	ND	ND	0	ND	
GSB-808	25.4	ND	ND	ND	ND	0	ND	
GSB-808	33.1	ND	ND	ND	ND	0	ND	
GSB-808	38.1	ND	ND	ND	ND	0	ND	
GSB-808	42.9	ND	ND	ND	ND	0	ND	
GSB-808	46.7	ND	ND	ND	ND	0	ND	
GSB-808	50.3	ND	ND	ND	ND	0	ND	

**Appendix G. Soil organic chemistry data spreadsheet. (Continued).**

Location ID Borehole	Depth (ft)	Benzene (mg/kg)	Ethylbenzene (mg/kg)	Toluene (mg/kg)	Total Xylene (mg/kg)	Total BTEX (mg/kg)	Gasoline Fingerprint (mg/kg)	Gasoline Fingerprint (ug/L)
GSB-808	52.7	ND	ND	ND	ND	0	ND	
GSB-808	56.3	ND	ND	ND	ND	0	ND	
GSB-808	57.8	ND	ND	ND	ND	0	ND	
GSB-808	61.1	ND	ND	ND	ND	0	ND	
GSB-808	66.3	ND	ND	ND	ND	0	ND	
GSB-808	70	ND	ND	ND	ND	0	ND	
GSB-808	73	ND	ND	ND	ND	0	0.5	
GSB-808	73.6	ND	1.6	0.24	18.9	20.74	230	
GSB-808	77.2	ND	6.2	1.4	43	50.6	280	
GSB-808	84.1	ND	0.69	0.05	5.4	6.14	260	
GSB-808	88.7	0.07	1.6	1.3	24	26.97	360	
GSB-808	95.3	24	43	140	210	417	1900	
GSB-808	99	43	84	290	420	837	4100	
GSB-808	107.3	1.9	4.4	9.8	26.5	42.6	240	
GSB-808	109.8	23	45	140	246	454	2200	
GSB-808	110.3	23	40	150	219	432	2400	
GSB-808	110.8	22	22	100	121	265	1300	
GSB-808	115.1	12	11	49	68	140	680	
GSB-808	119.9	66	71	260	370	767	3600	
GSB-808	122.7	9	24	70	144	247	1400	
GSB-808	128.3	0.01	ND	0.01	0.01	0.03	1.7	
GSB-808	133	ND	ND	ND	ND	0	ND	
GSB-808	134.8	ND	ND	ND	ND	0	ND	
GSB-808	141.4	0	ND	0.01	ND	0.01	ND	
GSB-808	144.8	ND	ND	0	ND	0	ND	
GSB-808	148.8	ND	ND	0	ND	0	ND	
GSB-809	96	ND	ND	ND	ND	0	ND	
GSB-809	101	ND	ND	ND	ND	0	ND	
GSB-809	106	ND	ND	ND	ND	0	ND	
GSB-809	111	ND	ND	ND	ND	0	ND	
GSB-809	116	0.01	ND	ND	ND	0.01	ND	
GSB-809	121	0.05	ND	ND	ND	0.05	ND	
GSB-809	125	0.13	ND	0	ND	0.13	ND	
GSB-809	131	0.17	0.03	0.04	0.04	0.28	0.6	
GSB-809	135.5	0.03	ND	0	0	0.03	ND	
GSB-809	135.75	ND	ND	ND	ND	0	ND	
GSB-809	140.5	0.01	ND	ND	ND	0.01	ND	
GSB-809	140.75	0.01	ND	ND	ND	0.01	ND	
GSB-810	95.5	ND	ND	ND	ND	0	ND	
GSB-810	101.25	0.03	ND	ND	0.01	0.04	ND	
GSB-810	105.75	ND	ND	ND	ND	0	ND	

**Appendix G. Soil organic chemistry data spreadsheet. (Continued).**

Location ID Borehole	Depth (ft)	Benzene (mg/kg)	Ethylbenzene (mg/kg)	Toluene (mg/kg)	Total Xylene (mg/kg)	Total BTEX (mg/kg)	Gasoline Fingerprint (mg/kg)	Gasoline Fingerprint (ug/L)
GSB-810	110.5	0.01	ND	ND	ND	0.01	ND	
GSB-810	116.25	0.01	ND	ND	ND	0.01	ND	
GSB-810	120.25	0.04	ND	ND	0	0.04	ND	
GSB-810	125.5	0.01	ND	ND	ND	0.01	ND	
GSB-810	130.75	0.01	ND	0	0	0.01	ND	
GSB-810	135	0.01	ND	ND	ND	0.01	ND	
GSB-810	140.75	0	ND	ND	ND	0	ND	
GSB-810	145.75	ND	ND	ND	ND	0	ND	
GSB-810	150	ND	ND	ND	ND	0	ND	
GSB-811	113.9	ND	ND	ND	ND	0	ND	
GSB-811	117.8	0.42	0.08	0.05	0.36	0.91	0.6	
GSB-811	121.1	1.3	0.4	2.6	2.16	6.46	9.7	
GSB-811	125.9	0	ND	0.01	0.02	0.03	0.5	
GSB-811	130.2	ND	ND	0	0	0	ND	
GSB-811	135.2	ND	ND	ND	ND	0	0.4	
GSB-811	139.7	ND	ND	ND	ND	0	ND	
GSB-910	78	ND	ND	ND	ND	0	ND	
GSB-910	81	ND	ND	ND	ND	0	ND	
GSB-910	85.5	ND	ND	ND	ND	0		
GSB-910	91	0	ND	0.01	0.01	0.02		
GSB-910	95.75	0	0	0.01	0.01	0.02	ND	
GSB-910	101.1	0.04	ND	ND	0.01	0.05	ND	
GSB-910	108	0.05	ND	ND	ND	0.05	ND	
GSB-910	115.6	0.03	ND	ND	0.01	0.04	ND	
GSB-910	117.3	0.1	ND	ND	ND	0.1	ND	
GSB-910	119	0.1	ND	ND	ND	0.1	ND	
GSB-910	124.6	0.3	ND	ND	ND	0.3	ND	
GSB-910	130.5	0	ND	ND	ND	0		
HW-GP-001	82.3	ND	ND	ND	ND	0	ND	
HW-GP-001	89	ND	ND	ND	ND	0	ND	
HW-GP-001	93.5	ND	ND	ND	ND	0	ND	
HW-GP-001	98	ND	ND	ND	ND	0	ND	
HW-GP-001	100.5	0.01	ND	ND	ND	0.01	ND	
HW-GP-001	105.5	ND	ND	ND	ND	0	ND	
HW-GP-001	109.5	ND	ND	ND	ND	0	ND	
HW-GP-001	113.5	0.01	ND	ND	ND	0.01	ND	
HW-GP-001	115	5.1	32	61	150	248.1	1500	
HW-GP-001	118.8	0.12	0.01	0.01	0.05	0.19	2	
HW-GP-002	78.8	ND	ND	ND	ND	0	ND	
HW-GP-002	81.8	ND	ND	ND	ND	0	ND	
HW-GP-002	84.9	ND	ND	ND	ND	0	ND	

**Appendix G. Soil organic chemistry data spreadsheet. (Continued).**

Location ID Borehole	Depth (ft)	Benzene (mg/kg)	Ethylbenzene (mg/kg)	Toluene (mg/kg)	Total Xylene (mg/kg)	Total BTEX (mg/kg)	Gasoline Fingerprint (mg/kg)	Gasoline Fingerprint (ug/L)
HW-GP-002	89.4	ND	ND	ND	ND	0	ND	
HW-GP-002	90.9	0.06	ND	ND	ND	0.06	ND	
HW-GP-002	95.4	0.05	ND	0.04	0.02	0.11	ND	
HW-GP-002	98.6	0.2	0.5	0.7	3.4	4.8	42	
HW-GP-002	101	ND	90	290	560	940	4200	
HW-GP-002	108.5	0.7	0.8	2.2	4.6	8.3	450	
HW-GP-002	115.4	1	ND	0.7	0.5	2.2	3.6	
HW-GP-002	118.6	40	60	200	380	680	2800	
HW-GP-003	86.4	ND	ND	ND	ND	0	ND	
HW-GP-003	90.4	ND	ND	ND	ND	0	ND	
HW-GP-003	93.8	0.02	ND	0.01	ND	0.03	ND	
HW-GP-003	100.5	0.04	0.08	0.14	0.46	0.72	17	
HW-GP-003	105	0.01	ND	0	ND	0.01	ND	
HW-GP-003	111.8	0.17	0.09	0.4	0.53	1.19	8.9	
HW-GP-003	115.9	0.78	0.56	1.7	3.1	6.14	45	
HW-GP-102	71.15	ND	ND	ND	ND	0	ND	
HW-GP-102	74.8	ND	ND	ND	ND	0	ND	
HW-GP-102	81.1	0.02	0.01	0.08	0.09	0.2	ND	
HW-GP-102	84.7	0.07	0.1	0.57	1.2	1.94	4.1	
HW-GP-102	85.75	0.1	0.04	0.21	0.34	0.69	2.9	
HW-GP-102	91.25	ND	ND	ND	ND	0	ND	
HW-GP-102	92.6	ND	ND	ND	ND	0	ND	
HW-GP-102	95.85	ND	ND	ND	ND	0	ND	
HW-GP-102	98.9	0.01	ND	0.01	0.03	0.05	2.1	
HW-GP-102	100.6	ND	ND	ND	ND	0	ND	
HW-GP-102	102.6	ND	ND	ND	ND	0	ND	
HW-GP-102	113.5	ND	ND	ND	ND	0	ND	
HW-GP-102	115.95	0.01	ND	0.01	0.01	0.03	ND	
HW-GP-102	117.25	0.03	ND	0.02	0.02	0.07	ND	
HW-GP-102	119.6	0.04	ND	0.06	0.04	0.14	ND	
HW-GP-102	124.7	ND	ND	ND	ND	0	ND	
HW-GP-102	127.6	ND	ND	ND	ND	0	ND	
HW-GP-102	131.3	ND	ND	ND	ND	0	ND	
HW-GP-103	70	ND	ND	ND	ND	0	ND	
HW-GP-103	75.25	ND	ND	ND	ND	0	ND	
HW-GP-103	81.35	ND	ND	ND	ND	0	ND	
HW-GP-103	84.7	ND	ND	ND	ND	0	ND	
HW-GP-103	90.4	ND	ND	ND	ND	0	ND	
HW-GP-103	95.4	6.7	27	44	170	247.7	3900	
HW-GP-103	101.5	0.01	0.13	0.15	0.85	1.14	10	
HW-GP-103	102.95	1.1	0.18	2.5	0.82	4.6	15	

**Appendix G. Soil organic chemistry data spreadsheet. (Continued).**

Location ID Borehole	Depth (ft)	Benzene (mg/kg)	Ethylbenzene (mg/kg)	Toluene (mg/kg)	Total Xylene (mg/kg)	Total BTEX (mg/kg)	Gasoline Fingerprint (mg/kg)	Gasoline Fingerprint (ug/L)
HW-GP-103	112	1.6	9.7	24	64	99.3	570	
HW-GP-103	120.5	0.15	0.05	0.16	0.62	0.98	7	
HW-GP-103	125.8	0.69	0.02	0.64	0.19	1.54	3.9	
HW-GP-103	129	0.01	0.01	0.04	0.07	0.13	1.6	
HW-GP-104	75.4	ND	ND	ND	ND	0	ND	
HW-GP-104	82	ND	ND	ND	ND	0	ND	
HW-GP-104	86.95	ND	ND	ND	ND	0	ND	
HW-GP-104	92.3	ND	ND	ND	0.33	0.33	52	
HW-GP-104	96.75	ND	ND	ND	ND	0	1	
HW-GP-104	107.25	ND	61	41	370	472	3000	
HW-GP-104	111.75	0.93	6	9.6	38	54.53	460	
HW-GP-104	116.5	16	53	150	280	499	2900	
HW-GP-104	131.75	0.02	0.06	0.16	0.34	0.58	6	
SVB-GP-008A	27.1	ND	ND	ND	ND	0		
SVB-GP-008A	29	ND	ND	ND	ND	0		
SVB-GP-008A	30	ND	ND	ND	ND	0		
SVB-GP-008A	31.8	ND	ND	ND	ND	0		
SVB-GP-008A	33	ND	ND	ND	ND	0		
SVB-GP-008A	35	ND	ND	ND	ND	0		
SVB-GP-008A	35.6	ND	ND	ND	ND	0		
SVB-GP-008A	36.9	ND	ND	ND	ND	0		
SVB-GP-008A	40.1	ND	ND	ND	ND	0		
SVB-GP-008A	41.4	0	ND	ND	ND	0		
SVB-GP-008A	44	0	ND	ND	ND	0		
SVB-GP-008A	46	ND	ND	ND	ND	0		
SVB-GP-008A	46	0	ND	0	0	0		
SVB-GP-008A	46.3	ND	ND	ND	ND	0		
SVB-GP-008A	46.3	0	ND	ND	ND	0		
SVB-GP-008A	47.1	ND	ND	ND	ND	0		
SVB-GP-008A	47.5	0	ND	0	ND	0		
SVB-GP-008A	50.6	ND	ND	ND	ND	0	ND	
SVB-GP-008A	52.1	ND	ND	ND	ND	0	3.3	
SVB-GP-008A	54.7	ND	ND	ND	ND	0	ND	
SVB-GP-008A	56.2	ND	ND	ND	ND	0		
SVB-GP-008A	56.4	ND	ND	ND	ND	0	94	
SVB-GP-008A	59.6	ND	ND	ND	ND	0	20	
SVB-GP-008A	60	ND	ND	ND	0.01	0.01		
SVB-GP-008A	60.9	ND	ND	ND	ND	0	21	
SVB-GP-008A	63	ND	ND	ND	ND	0	6.9	
SVB-GP-008A	63.4	ND	ND	ND	ND	0	0.4	
SVB-GP-008A	64.4	ND	ND	ND	ND	0	ND	

**Appendix G. Soil organic chemistry data spreadsheet. (Continued).**

Location ID Borehole	Depth (ft)	Benzene (mg/kg)	Ethylbenzene (mg/kg)	Toluene (mg/kg)	Total Xylene (mg/kg)	Total BTEX (mg/kg)	Gasoline Fingerprint (mg/kg)	Gasoline Fingerprint (ug/L)
SVB-GP-008A	64.4	ND	ND	ND	ND	0		
SVB-GP-008A	65.7	ND	ND	ND	ND	0	3.9	
SVB-GP-008A	67.4	ND	ND			0		
SVB-GP-008A	67.4			ND	ND	0	4.6	
SVB-GP-008A	67.4	ND	ND	ND	0.01	0.01		
SVB-GP-008A	68.6	ND	ND	ND	ND	0	1	
SVB-GP-008A	69.2	ND	ND	ND	ND	0		
SVB-GP-008A	70.3	ND	ND	ND	0.6	0.6		
SVB-GP-008A	70.3	0	ND	0	0	0		
SVB-GP-008A	73	ND	ND	ND	36	36		
SVB-GP-008A	73.5	ND	ND	ND	8.5	8.5		
SVB-GP-008A	74.5	ND	ND	7	40	47		
SVB-GP-008A	77.5	ND	110	18	560	688		
SVB-GP-008A	77.7	ND	ND			0		
SVB-GP-008A	77.7			ND	440	440	1400	
SVB-GP-008A	77.7	ND	13	3	120	136		
SVB-GP-008A	79	ND	ND	ND	60	60		
SVB-GP-008A	80.2	ND	ND	ND	ND	0		
SVB-GP-008A	80.2	ND	0.22	0.03	2	2.25		
SVB-GP-008A	82.9	ND	ND	ND	ND	0		
SVB-GP-008A	83.2	ND	ND	ND	ND	0		
SVB-GP-008A	84.9	ND	ND	ND	80	80		
SVB-GP-008A	85.2	ND	ND	ND	40	40		
SVB-GP-008A	87.3	ND	ND	ND	120	120		
SVB-GP-008A	88.9	ND	ND	ND	420	420		
SVB-GP-013	6.9	ND	ND	ND	ND	0	ND	
SVB-GP-013	10.2	ND	ND	ND	ND	0	ND	
SVB-GP-013	13.4	ND	ND	ND	ND	0	ND	
SVB-GP-013	16.5	ND	ND	ND	ND	0	ND	
SVB-GP-013	19.2	ND	ND	ND	ND	0	3.5	
SVB-GP-013	22	ND	ND	ND	ND	0	36	
SVB-GP-013	22.6	ND	ND	ND	ND	0	90	
SVB-GP-013	25.2	ND	ND	ND	ND	0	140	
SVB-GP-013	27.2	ND	ND	ND	ND	0	33	
SVB-GP-013	28.2	ND	ND	ND	2.3	2.3	780	
SVB-GP-013	29.1	ND	ND	ND	0.01	0.01	1.8	
SVB-GP-013	31	ND	ND	ND	0.01	0.01	3.4	
SVB-GP-013	32.6	ND	ND	ND	0.12	0.12	33	
SVB-GP-013	34.1	0.05	0.62	0.1	37	37.77	190	
SVB-GP-013	36.2	ND	ND			0		
SVB-GP-013	36.2			ND	5.2	5.2	1000	

**Appendix G. Soil organic chemistry data spreadsheet. (Continued).**

Location ID Borehole	Depth (ft)	Benzene (mg/kg)	Ethylbenzene (mg/kg)	Toluene (mg/kg)	Total Xylene (mg/kg)	Total BTEX (mg/kg)	Gasoline Fingerprint (mg/kg)	Gasoline Fingerprint (ug/L)
SVB-GP-013	37	ND	ND			0		
SVB-GP-013	37			0.01	0.11	0.12	33	
SVB-GP-013	38.9	ND	0.01			0.01		
SVB-GP-013	38.9			ND	0.14	0.14	22	
SVB-GP-013	40.3	ND	0.23			0.23		
SVB-GP-013	40.3			ND	5.5	5.5	1100	
SVB-GP-013	43.7	ND	0.87		ND	17	17	2000
SVB-GP-013	43.7					0.87		
SVB-GP-013	45	ND	0.99		ND	11	11	1500
SVB-GP-013	45					2		
SVB-GP-013	45.9	ND	2		ND	24	24	800
SVB-GP-013	45.9					0.12		
SVB-GP-013	46.6	ND	0.12		0.01	4.3	4.31	230
SVB-GP-013	46.6					0		
SVB-GP-013	48	ND	ND		ND	0.03	0.03	1.9
SVB-GP-013	48					0		
SVB-GP-013	50.1	ND	ND			0.02	0.02	1.5
SVB-GP-013	50.1					0		
SVB-GP-013	51.7	ND	ND			0		
SVB-GP-013	51.7					0.01	0.04	0.05
SVB-GP-013	52.5	ND	0.01		0.02	0.08	0.1	15
SVB-GP-013	52.5					0		
SVB-GP-013	54.4	ND	ND		ND	ND	0	ND
SVB-GP-013	56.2	ND	ND				0	
SVB-GP-013	56.2					0.01	0.02	0.03
SVB-GP-013	56.2					0		
SVB-GP-013	57.5	ND	ND		ND	ND	0	ND
SVB-GP-013	57.9	ND	ND		ND	ND	0	ND
SVB-GP-013	58.6	ND	ND		ND	ND	0	1.8
SVB-GP-013	61.1	ND	ND				0	
SVB-GP-013	61.1						0	
SVB-GP-013	62.5	ND	ND		ND	ND	0	ND
SVB-GP-013	62.5					0		
SVB-GP-013	64.3	ND	ND		ND	ND	0	ND
SVB-GP-013	64.3					0		
SVB-GP-013	64.9	ND	ND		ND	ND	0	ND
SVB-GP-013	64.9					0		
SVB-GP-013	66.4	ND	ND		ND	ND	0	ND
SVB-GP-013	66.4					0		
SVB-GP-013	68.9	ND	ND		ND	ND	0	
SVB-GP-013	68.9					0		1.8
SVB-GP-013	69.7	ND	ND				0	

**Appendix G. Soil organic chemistry data spreadsheet. (Continued).**

Location ID Borehole	Depth (ft)	Benzene (mg/kg)	Ethylbenzene (mg/kg)	Toluene (mg/kg)	Total Xylene (mg/kg)	Total BTEX (mg/kg)	Gasoline Fingerprint (mg/kg)	Gasoline Fingerprint (ug/L)
SVB-GP-013	69.7			ND	0.01	0.01	1.6	
SVB-GP-013	71	ND	0.05			0.05		
SVB-GP-013	71			0.02	0.62	0.64	23	
SVB-GP-013	72.9	ND	0.01			0.01		
SVB-GP-013	72.9			0.01	0.1	0.11	2.9	
SVB-GP-013	74.6	3	26	75	140	244	1600	
SVB-GP-013	75.2	ND	6	14	30	50	290	
SVB-GP-013	78.2	ND	8	14	45	67	360	
SVB-GP-013	79	ND	9	8	61	78	860	
SVB-GP-013	80.5	ND	7	5	68	80	1500	
SVB-GP-013	82.3	ND	ND	ND	1.2	1.2	93	
SVB-GP-013	83.3	ND	3	3	31	37	580	
SVB-GP-013	85.5	ND	2.2	1.7	21	24.9	350	
SVB-GP-013	86.8	ND	3.7	5.3	20	29	270	
SVB-GP-013	87.7	4.4	9.5	29	45	87.9	750	
SVB-GP-014	4.1	ND	ND	ND	ND	0		
SVB-GP-014	9.6	ND	ND	ND	ND	0		
SVB-GP-014	14.7	ND	ND	ND	ND	0		
SVB-GP-014	19.5	ND	ND	ND	ND	0		
SVB-GP-014	24.1	ND	ND	ND	ND	0		
SVB-GP-014	27.2	ND	ND	ND	ND	0		ND
SVB-GP-014	31.3	ND	ND	ND	ND	0		ND
SVB-GP-014	34	ND	ND	ND	ND	0		ND
SVB-GP-014	37.4	ND	ND	ND	ND	0		ND
SVB-GP-014	39.6	ND	ND	ND	ND	0		ND
SVB-GP-014	42.2	ND	ND	ND	ND	0		ND
SVB-GP-014	43.2	ND	ND	ND	ND	0		ND
SVB-GP-014	44.3	ND	ND	ND	ND	0		ND
SVB-GP-014	46	ND	ND	ND	ND	0	1.9	
SVB-GP-014	47.7	ND	ND	ND	ND	0		
SVB-GP-014	49.1	ND	ND	ND	ND	0		
SVB-GP-014	51	ND	ND	ND	ND	0		
SVB-GP-014	53	ND	ND	ND	ND	0		
SVB-GP-014	55.3	ND	ND	ND	ND	0		
SVB-GP-014	55.9	ND	ND	ND	ND	0		
SVB-GP-014	58.1	ND	ND	ND	ND	0		
SVB-GP-014	59.6	ND	ND	ND	ND	0		ND
SVB-GP-014	61.2	ND	ND	ND	ND	0		
SVB-GP-014	62.8	ND	ND	ND	ND	0		
SVB-GP-014	65	ND	ND	ND	ND	0		
SVB-GP-014	66.4	ND	ND	ND	ND	0		

**Appendix G. Soil organic chemistry data spreadsheet. (Continued).**

Location ID Borehole	Depth (ft)	Benzene (mg/kg)	Ethylbenzene (mg/kg)	Toluene (mg/kg)	Total Xylene (mg/kg)	Total BTEX (mg/kg)	Gasoline Fingerprint (mg/kg)	Gasoline Fingerprint (ug/L)
SVB-GP-014	68	ND	ND	ND	ND	0		
SVB-GP-014	70.1	0.03	ND	ND	0.01	0.04	ND	
SVB-GP-014	70.8	ND	ND	ND	ND	0	ND	
SVB-GP-014	73.2	ND	ND	ND	ND	0	ND	
SVB-GP-014	74.5	ND	ND	ND	ND	0	ND	
SVB-GP-014	76	ND	ND	ND	ND	0	ND	
SVB-GP-014	77.5	ND	ND	ND	ND	0	ND	
SVB-GP-014	79.1	ND	ND	ND	0.02	0.02	0.6	
SVB-GP-014	79.8	ND	ND	ND	ND	0	0.4	
SVB-GP-014	81.3	ND	ND	ND	ND	0	ND	
SVB-GP-014	82.3	ND	ND	ND	ND	0	ND	
SVB-GP-014	85	0.1	0.8	1.3	5.5	7.7	76	
SVB-GP-014	85.9	ND	10	9	81	100	1000	
SVB-GP-014	87.3	0.01	ND	0.01	0.03	0.05	3.2	
SVB-GP-014	88.9	ND	ND	0.4	9.8	10.2	130	
TEP-GP-001	3.7	ND	ND	ND	ND	0	ND	
TEP-GP-001	9.5	ND	ND	ND	ND	0	ND	
TEP-GP-001	20.1	ND	ND	ND	ND	0	ND	
TEP-GP-001	21.6	ND	ND	ND	ND	0	ND	
TEP-GP-001	26.2	ND	ND	ND	ND	0	ND	
TEP-GP-001	29.8	ND	ND	ND	ND	0	ND	
TEP-GP-001	32.1	ND	ND	ND	ND	0	ND	
TEP-GP-001	36.3	ND	ND	ND	ND	0	ND	
TEP-GP-001	39.7	ND	ND	ND	ND	0	ND	
TEP-GP-001	45.4	ND	ND	ND	ND	0	ND	
TEP-GP-001	56.9	ND	ND	ND	ND	0	ND	
TEP-GP-001	60	ND	ND	ND	ND	0	ND	
TEP-GP-001	65.1	ND	ND	ND	ND	0	ND	
TEP-GP-001	69.9	ND	ND	ND	ND	0	ND	
TEP-GP-001	72.3	ND	ND	ND	ND	0	ND	
TEP-GP-001	74.8	ND	ND	ND	ND	0	ND	
TEP-GP-001	78.1	ND	ND	ND	ND	0	ND	
TEP-GP-001	81.3	ND	ND	ND	ND	0	ND	
TEP-GP-001	84.9	ND	ND	ND	ND	0	ND	
TEP-GP-001	86.8	ND	ND	ND	ND	0	ND	
TEP-GP-001	89.9	ND	ND	ND	ND	0	ND	
TEP-GP-001	92.1	ND	ND	ND	ND	0	ND	
TEP-GP-001	95.3	ND	ND	ND	ND	0	ND	
TEP-GP-001	101.1	ND	ND	ND	ND	0	ND	
TEP-GP-001	105.1	ND	ND	ND	ND	0	ND	
TEP-GP-001	110.1	0.02	ND	ND	ND	0.02	ND	

**Appendix G. Soil organic chemistry data spreadsheet. (Continued).**

Location ID Borehole	Depth (ft)	Benzene (mg/kg)	Ethylbenzene (mg/kg)	Toluene (mg/kg)	Total Xylene (mg/kg)	Total BTEX (mg/kg)	Gasoline Fingerprint (mg/kg)	Gasoline Fingerprint (ug/L)
TEP-GP-001	112.5	0.07	ND	ND	ND	0.07	ND	
TEP-GP-001	114.7	ND	ND	ND	ND	0	ND	
TEP-GP-001	124	ND	ND	ND	ND	0	0.6	
TEP-GP-001	128.3	ND	ND	ND	ND	0		ND
TEP-GP-001	134.9	ND	ND	ND	ND	0		ND
TEP-GP-001	139.8	ND	ND	ND	ND	0		ND
TEP-GP-001	145	ND	ND	ND	ND	0	ND	
TEP-GP-001	147.8	ND	ND	ND	ND	0	ND	
TEP-GP-001	150.1	ND	ND	ND	ND	0	ND	
TEP-GP-001	154.9	ND	ND	ND	ND	0	ND	
TEP-GP-001	164	ND	ND	ND	ND	0	ND	
TEP-GP-003	10.3	ND	ND	ND	ND	0	ND	
TEP-GP-003	20	ND	ND	ND	ND	0	ND	
TEP-GP-003	33	ND	ND	ND	ND	0	ND	
TEP-GP-003	40.5	ND	ND	ND	ND	0	ND	
TEP-GP-003	43	ND	ND	ND	ND	0	ND	
TEP-GP-003	48.8	ND	ND	ND	ND	0	ND	
TEP-GP-003	55	ND	ND	ND	ND	0	ND	
TEP-GP-003	61.5	ND	ND	ND	ND	0	ND	
TEP-GP-003	65	ND	ND	ND	ND	0	ND	
TEP-GP-003	71.2	ND	ND	ND	ND	0	ND	
TEP-GP-003	72.4	ND	ND	ND	ND	0	ND	
TEP-GP-003	78.8	ND	ND	ND	ND	0	ND	
TEP-GP-003	85.3	ND	ND	ND	ND	0	ND	
TEP-GP-003	90	ND	ND	ND	ND	0	ND	
TEP-GP-003	95.5	0.01	ND	ND	ND	0.01	ND	
TEP-GP-003	100.2	0.11	ND	ND	0.01	0.12	ND	
TEP-GP-003	109.1	ND	ND	ND	ND	0	ND	
TEP-GP-003	112	ND	ND	ND	ND	0	ND	
TEP-GP-003	116	ND	ND	ND	ND	0	ND	
TEP-GP-003	120.4	ND	ND	ND	ND	0	ND	
TEP-GP-003	121.6	ND	ND	ND	ND	0	ND	
TEP-GP-003	122.7	ND	ND	ND	ND	0	ND	
TEP-GP-003	130.2	ND	ND	ND	ND	0	ND	
TEP-GP-003	134.9	ND	ND	ND	ND	0	ND	
TEP-GP-003	137.9	ND	ND	ND	ND	0	ND	
TEP-GP-003	140.1	ND	ND	ND	ND	0	ND	
TEP-GP-003	141	ND	ND	ND	ND	0	ND	
TEP-GP-003	144.2	ND	ND	ND	ND	0	ND	
TEP-GP-003	146.3	ND	ND	ND	ND	0	ND	
TEP-GP-003	148.2	ND	ND	ND	ND	0	ND	

Appendix G. Soil organic chemistry data spreadsheet. (Continued).

Location ID Borehole	Depth (ft)	Benzene (mg/kg)	Ethylbenzene (mg/kg)	Toluene (mg/kg)	Total Xylene (mg/kg)	Total BTEX (mg/kg)	Gasoline Fingerprint (mg/kg)	Gasoline Fingerprint (ug/L)
TEP-GP-003	150.6	ND	ND	ND	ND	0	ND	
TEP-GP-003	154	ND	ND	ND	ND	0	ND	
TEP-GP-003	155.2	ND	ND	ND	ND	0	ND	
TEP-GP-003	156.8	ND	ND	ND	ND	0	ND	
TEP-GP-004	9.6	ND	ND	ND	ND	0	ND	
TEP-GP-004	10.4	ND	ND	ND	ND	0	ND	
TEP-GP-004	16.7	ND	ND	ND	ND	0	ND	
TEP-GP-004	19.5	ND	ND	ND	ND	0	ND	
TEP-GP-004	21.3	ND	ND	ND	ND	0	ND	
TEP-GP-004	31.3	ND	ND	ND	ND	0	ND	
TEP-GP-004	40.2	ND	ND	ND	ND	0	ND	
TEP-GP-004	44.8	ND	ND	ND	ND	0	ND	
TEP-GP-004	48.8	ND	ND	ND	ND	0	ND	
TEP-GP-004	51.8	ND	ND	ND	ND	0	ND	
TEP-GP-004	54.7	ND	ND	ND	ND	0	ND	
TEP-GP-004	61.3	ND	ND	ND	ND	0	ND	
TEP-GP-004	63.5	ND	ND	ND	ND	0	ND	
TEP-GP-004	68	ND	ND	ND	ND	0	ND	
TEP-GP-004	70.5	ND	ND	ND	ND	0	ND	
TEP-GP-004	74.3	ND	ND	ND	ND	0	ND	
TEP-GP-004	77	ND	ND	ND	ND	0	ND	
TEP-GP-004	81.3	ND	ND	ND	ND	0	ND	
TEP-GP-004	84.8	ND	ND	ND	ND	0	ND	
TEP-GP-004	88.3	ND	ND	ND	ND	0	ND	
TEP-GP-004	91.2	ND	ND	ND	ND	0	ND	
TEP-GP-004	97.7	ND	ND	ND	ND	0	ND	
TEP-GP-004	100.2	0.03	ND	ND	ND	0.03	ND	
TEP-GP-004	102.6	0.07	ND	0	0.01	0.08	ND	
TEP-GP-004	104	0	ND	ND	ND	0	ND	
TEP-GP-004	108.7	1	8.4	17	45	71.4	350	
TEP-GP-004	114.8	0.19	ND	0.25	0.16	0.6	1.4	
TEP-GP-004	119.9	0.21	0.03	0.13	0.11	0.48	1.4	
TEP-GP-004	122.6	0.81	ND	ND	0.14	0.95	1.8	
TEP-GP-004	126.9	0	ND	ND	ND	0	ND	
TEP-GP-004	131.5	ND	ND	ND	ND	0	ND	
TEP-GP-004	132.5	ND	ND	ND	ND	0	ND	
TEP-GP-004	140	ND	ND	ND	ND	0	ND	
TEP-GP-004	145	ND	ND	ND	ND	0	ND	
TEP-GP-004	147	ND	ND	ND	ND	0	ND	
TEP-GP-004	154.9	ND	ND	ND	ND	0	ND	
TEP-GP-004	158	ND	ND	ND	ND	0	ND	

**Appendix G. Soil organic chemistry data spreadsheet. (Continued).**

Location ID Borehole	Depth (ft)	Benzene (mg/kg)	Ethylbenzene (mg/kg)	Toluene (mg/kg)	Total Xylene (mg/kg)	Total BTEX (mg/kg)	Gasoline Fingerprint (mg/kg)	Gasoline Fingerprint (ug/L)
TEP-GP-004	160	ND	ND	ND	ND	0	ND	
TEP-GP-005	5.5	ND	ND	ND	ND	0	ND	
TEP-GP-005	15.3	ND	ND	ND	ND	0	ND	
TEP-GP-005	17.2	ND	ND	ND	ND	0	ND	
TEP-GP-005	24.3	ND	ND	ND	ND	0	ND	
TEP-GP-005	27.3	ND	ND	ND	ND	0	ND	
TEP-GP-005	36.9	ND	ND	ND	ND	0	ND	
TEP-GP-005	39	ND	ND	ND	ND	0	ND	
TEP-GP-005	46	ND	ND	ND	ND	0	ND	
TEP-GP-005	55.9	ND	ND	ND	ND	0	ND	
TEP-GP-005	58.5	ND	ND	ND	ND	0	ND	
TEP-GP-005	64.5	ND	ND	ND	ND	0	ND	
TEP-GP-005	68.5	ND	ND	ND	ND	0	ND	
TEP-GP-005	72.7	ND	ND	ND	ND	0	ND	
TEP-GP-005	74.9	ND	ND	ND	ND	0	ND	
TEP-GP-005	77.6	ND	ND	ND	ND	0	ND	
TEP-GP-005	82.3	ND	ND	ND	ND	0	ND	
TEP-GP-005	89.1	ND	ND	ND	ND	0	ND	
TEP-GP-005	91.4	ND	ND	ND	ND	0	ND	
TEP-GP-005	94.8	ND	ND	ND	ND	0	ND	
TEP-GP-005	100.7	ND	ND	ND	ND	0	ND	
TEP-GP-005	112.9	0.57	ND	ND	0.04	0.61	ND	
TEP-GP-005	116.8	1.1	6.3	13	35	55.4	34	
TEP-GP-005	120.4	0.8	2.1	5.9	11.1	19.9	120	
TEP-GP-005	132.6	ND	ND	ND	ND	0	ND	
TEP-GP-005	141.8	ND	ND	ND	ND	0	ND	
TEP-GP-005	153	ND	ND	ND	ND	0	ND	
TEP-GP-005	158.5	0.01	0.01	0.03	0.05	0.1	4.8	
TEP-GP-006	13.5	ND	ND	ND	ND	0	ND	
TEP-GP-006	19.9	ND	ND	ND	ND	0	ND	
TEP-GP-006	23.7	ND	ND	ND	ND	0	ND	
TEP-GP-006	29.4	ND	ND	ND	ND	0	ND	
TEP-GP-006	30.5	ND	ND	ND	ND	0	ND	
TEP-GP-006	101	0.01	ND	ND	ND	0.01	ND	
TEP-GP-007	90.9	0.24	0.01	0.02	0.13	0.4	14.5	
TEP-GP-007	93.4					0	0.4	
TEP-GP-007	96.6	0.85	0.52	1.1	3.08	5.55	13.9	
	0					0	24	
TEP-GP-007	102	0.87	2.2	4.9	11	18.97	17.4	
	0					0	60	
TEP-GP-007	107.3	0.6	0.1	0.61	0.68	1.99	15.1	

**Appendix G. Soil organic chemistry data spreadsheet. (Continued).**

Location ID Borehole	Depth (ft)	Benzene (mg/kg)	Ethylbenzene (mg/kg)	Toluene (mg/kg)	Total Xylene (mg/kg)	Total BTEX (mg/kg)	Gasoline Fingerprint (mg/kg)	Gasoline Fingerprint (ug/L)
	0					0	14	
TEP-GP-007	112	0.81	0.1	0.5	0.58	1.99	0.4	
TEP-GP-007	115	2	11	22	66	101	24	
TEP-GP-007	119.5					0	500	
TEP-GP-007	128.5	ND	ND	ND	ND	0	0.4	
TEP-GP-007	133.3	0	ND	0	ND	0	315.8	
TEP-GP-007	134.4					0	ND	
TEP-GP-007	136.7	ND	ND	ND	ND	0	0.5	
TEP-GP-007	137.8	ND	ND	0	ND	0	77.4	
TEP-GP-007	142.5					0	0.5	
TEP-GP-007	149.3	ND	ND	ND	ND	0	ND	
TEP-GP-007	154.5	0.01	ND	0.01	0	0.02	0.4	
TEP-GP-007	156.7	ND	ND	ND	ND	0	ND	
TEP-GP-008	93.2	0.7	0.27	0.82	1.7	3.49	22	
TEP-GP-008	96.4	0.09	0.01	0.11	0.09	0.3	1.7	
TEP-GP-008	106.6	0.21	0.09	0.27	0.49	1.06	1.4	
TEP-GP-008	110.8	1	0.13	1	0.6	2.73	4.7	
TEP-GP-008	118	2	1.1	4.1	6	13.2	60	
TEP-GP-008	127.5	ND	ND	ND	ND	0	ND	
TEP-GP-008	132.1	ND	ND	ND	ND	0	ND	
TEP-GP-008	138.5	ND	ND	ND	ND	0	ND	
TEP-GP-008	141.4	0.03	0	0.03	0.03	0.09	ND	
TEP-GP-008	146	ND	ND	ND	ND	0	ND	
TEP-GP-008	151	0.02	0	0.03	0.02	0.07	ND	
TEP-GP-009	92.5	ND	ND	ND	ND	0	ND	
TEP-GP-009	97.5	0.7	4.1	6.9	21	32.7	180	
TEP-GP-009	103	0.07	0.01	0.08	0.04	0.2	0.9	
TEP-GP-009	108	1.6	3.2	7.3	16	28.1	120	
TEP-GP-009	113.2	2.6	6.8	12	29	50.4	250	
TEP-GP-009	116.5	4	16	29	90	139	620	
TEP-GP-009	131	ND	ND	ND	ND	0	ND	
TEP-GP-009	136.3	ND	ND	ND	ND	0	ND	
TEP-GP-009	142.5	0.08	0.01	0.1	0.08	0.27	1.7	
TEP-GP-009	149.3	ND	ND	ND	ND	0	ND	
TEP-GP-009	153.5	0.01	ND	ND	ND	0.01	ND	
TEP-GP-009	158.8	ND	ND	ND	ND	0	ND	
TEP-GP-010	38.5	ND	ND		ND	0		
TEP-GP-010	38.5	ND	ND	ND	ND	0	ND	
TEP-GP-010	38.5	ND	ND	ND	ND	0		
TEP-GP-010	40.6	ND	ND			0		

**Appendix G. Soil organic chemistry data spreadsheet. (Continued).**

Location ID Borehole	Depth (ft)	Benzene (mg/kg)	Ethylbenzene (mg/kg)	Toluene (mg/kg)	Total Xylene (mg/kg)	Total BTEX (mg/kg)	Gasoline Fingerprint (mg/kg)	Gasoline Fingerprint (ug/L)
TEP-GP-010	40.6			ND	ND	0		ND
TEP-GP-010	40.6	ND	ND	ND	ND	0		
TEP-GP-010	40.6	ND	ND	ND	ND	0		
TEP-GP-010	43.5	ND	ND			0		
TEP-GP-010	43.5			ND	ND	0		ND
TEP-GP-010	43.5	ND	ND	ND	0.05	0.05		
TEP-GP-010	43.5	ND	ND	ND	ND	0		
TEP-GP-010	48.9	ND	ND			0		
TEP-GP-010	48.9			ND	ND	0		4.9
TEP-GP-010	48.9	0.23	ND	0.73	0.01	0.97		
TEP-GP-010	48.9	ND	ND	ND	1.2	1.2		
TEP-GP-010	55.8	ND	ND			0		
TEP-GP-010	55.8			ND	13	13		1100
TEP-GP-010	55.8	20	2	100	27	149		
TEP-GP-010	55.8	ND	30	ND	170	200		
TEP-GP-010	62.6	ND	ND			0		
TEP-GP-010	62.6			ND	ND	0		18
TEP-GP-010	62.6	ND	1	3	6	10		
TEP-GP-010	62.6	ND	ND	ND	ND	0		
TEP-GP-010	70.5	ND	ND	0	0	0		ND
	0	ND	ND	ND	ND	0		
TEP-GP-010	77.3	ND	1	0.5	128	129.5		1500
	0	ND	17	ND	23	40		
TEP-GP-010	83.5	ND	ND	0.01	ND	0.01		ND
	0	ND	ND	ND	ND	0		
TEP-GP-010	87.5	ND	0.04	0.01	0.03	0.08		20
	0	ND	ND	0.05	0.38	0.43		
TEP-GP-010	94	3.6	60	93	580	736.6		4200
	0	ND	74	90	850	1014		
TEP-GP-010	103.5	59	99	690	480	1328		4000
	0	ND	46	77	240	363		
TEP-GP-010	107.8	9	24	61	122	216		980
	0	1.6	3.2	8	15	27.8		
TEP-GP-010	110.3	87	180	930	710	1907		6100
	0	130	280	1000	1400	2810		
TEP-GP-010	117	8.9	1.1	34	7.4	51.4		400
	0	0.8	12	3.7	68	84.5		
TEP-GP-010	124.5	2.2	3.2	9.1	17	31.5		170
	0	1.8	4.5	9.2	22	37.5		
TEP-GP-010	135.5	0.01	0.01	0.02	0.06	0.1		0.7
	0	0.01	ND	0.01	0.01	0.03		

**Appendix G. Soil organic chemistry data spreadsheet. (Continued).**

Location ID Borehole	Depth (ft)	Benzene (mg/kg)	Ethylbenzene (mg/kg)	Toluene (mg/kg)	Total Xylene (mg/kg)	Total BTEX (mg/kg)	Gasoline Fingerprint (mg/kg)	Gasoline Fingerprint (ug/L)
TEP-GP-010	139.5	0.01	ND	0	0.01	0.02	ND	
	0	ND	ND	0.01	ND	0.01		
TEP-GP-010	145.2	0.01	ND	0	ND	0.01	ND	
	0	ND	ND	0.01	ND	0.01		
TEP-GP-010	149.8	0.01	0.01	0.02	0.03	0.07	ND	
	0	0.01	ND	0.01	ND	0.02		
TEP-GP-010	153.2	0.03	0.01	0.06	0.06	0.16	35	
	0	0.5	0.8	2.4	4.5	8.2		
TEP-GP-010	160.5	ND	ND	ND	ND	0	ND	
	0	ND	ND	ND	ND	0		
TEP-GP-011	95.5	ND	ND	ND	ND	0	ND	
TEP-GP-011	100.2	ND	ND	ND	ND	0	ND	
TEP-GP-011	110.2	ND	ND	ND	ND	0	ND	
TEP-GP-011	115	ND	ND	ND	ND	0	ND	
TEP-GP-011	120.1	ND	ND	ND	ND	0	ND	
TEP-GP-011	133.8	ND	ND	ND	ND	0	ND	
TEP-GP-011	137.6	ND	ND	ND	ND	0	ND	
TEP-GP-011	142.5	ND	ND	ND	ND	0	ND	
TEP-GP-011	149	ND	ND	ND	ND	0	ND	
TEP-GP-011	154	ND	ND	ND	ND	0	ND	
TEP-GP-011	159.3	ND	ND	ND	ND	0	ND	
TEP-GP-105	76.25	ND	ND	ND	ND	0	ND	
TEP-GP-105	76.5	ND	ND	ND	ND	0	ND	
TEP-GP-105	81.75	ND	ND	ND	ND	0	ND	
TEP-GP-105	82	ND	ND	ND	ND	0	ND	
TEP-GP-105	84.25	ND	ND	ND	ND	0	ND	
TEP-GP-105	91.75	ND	ND	ND	ND	0	ND	
TEP-GP-105	92	ND	ND	0.01	0.01	0.02	ND	
TEP-GP-105	96.1	ND	ND	ND	ND	0	ND	
TEP-GP-105	96.35	ND	ND	ND	ND	0		
TEP-GP-105	101.55	ND	ND	ND	ND	0	ND	
TEP-GP-105	104.65	ND	ND	ND	ND	0	ND	
TEP-GP-105	109.35	0.8	ND	2.9	2.3	6	21	
TEP-GP-105	109.6	0.37	0.16	1	1	2.53		
TEP-GP-105	112	2.8	2.3	12	13	30.1	120	
TEP-GP-105	112.3	1.7	3.5	22	42	69.2	210	
TEP-GP-105	116.95	13	24	81	140	258	1400	
TEP-GP-105	122.3	1.4	ND	4.2	3.2	8.8	23	
TEP-GP-105	125.3	0.27	0.18	0.92	0.91	2.28	9	
TEP-GP-105	125.55	ND	ND	0.01	0.01	0.02	1	
TEP-GP-105	130.75		ND	ND	ND	0	ND	

**Appendix G. Soil organic chemistry data spreadsheet. (Continued).**

Location ID Borehole	Depth (ft)	Benzene (mg/kg)	Ethylbenzene (mg/kg)	Toluene (mg/kg)	Total Xylene (mg/kg)	Total BTEX (mg/kg)	Gasoline Fingerprint (mg/kg)	Gasoline Fingerprint (ug/L)
TEP-GP-105	132	0.01	ND	0.03	0.03	0.07	ND	
	0		ND	ND	ND	0	ND	
TEP-GP-106	76.25	ND	ND	ND	ND	0	ND	
TEP-GP-106	81.75	ND	ND	ND	ND	0	ND	
TEP-GP-106	82	ND	ND	ND	ND	0	ND	
TEP-GP-106	87.3	ND	ND	ND	ND	0	ND	
TEP-GP-106	87.8	ND	ND	ND	ND	0	ND	
TEP-GP-106	93.6	ND	ND	ND	ND	0		ND
TEP-GP-106	93.85	ND	ND	ND	ND	0	ND	
TEP-GP-106	95.85	ND	ND	ND	ND	0	ND	
TEP-GP-106	96.1	ND	ND	ND	ND	0		ND
TEP-GP-106	100.25	ND	ND	ND	ND	0	ND	
TEP-GP-106	100.7	ND	ND	ND	ND	0		ND
TEP-GP-106	103.8	ND	ND	ND	ND	0	ND	
TEP-GP-106	106.75	ND	ND	ND	ND	0	ND	
TEP-GP-106	107	ND	ND	ND	ND	0	ND	
TEP-GP-106	109.35	ND	ND	ND	ND	0	ND	
TEP-GP-106	109.6	ND	ND	ND	ND	0	ND	
TEP-GP-106	115.35	ND	ND	ND	ND	0	ND	
TEP-GP-106	115.6	ND	ND	ND	ND	0	ND	
TEP-GP-106	128	ND	ND	ND	ND	0	ND	
TEP-GP-106	128.5	ND	ND	ND	ND	0	ND	
TEP-GP-106	130.75	ND	ND	ND	ND	0	ND	
TEP-GP-106	131	ND	ND	ND	ND	0	ND	
TEP-GP-106	135	ND	ND	ND	ND	0	ND	



## **Appendix H**

### **BTD Results**

**Appendix H. BTD results.**

Date Sampled	Bore Depth Feet	Sample Temp.* °C	Holding Time Days	TPH** mg/kg	LOD mg/kg	Analysis Time Hours	Field Spike*** % Recovery	Core Spike**** % Recovery	Lab Spike***** % Recovery
<b>HW-GP-103</b>									
8/17/93	43.65	28	35	•	•	6.0	•	46.9§	•
8/17/93	43.90	28	1	0.0047	0.0003	3.0	13.9	•	96.9
8/17/93	44.15	28	1	0.0030	0.0003	3.0	18.6	38.2	•
8/17/93	51.40	32	34	0.0131	0.0003	2.0	•	93.7	90.4
8/18/93	75.50	61	2	0.0072	0.0003	3.0	20.7	•	101.1
8/18/93	84.95	68	5	0.0866	0.0004	4.0	40.6	•	82.8
<b>HW-GP-104</b>									
8/25/93	40.35		1	0.0523	0.0003	6.0	66.8	•	92.8
8/25/93	40.60		0	0.0660	0.0003	4.0	1.3	•	14.3
8/25/93	40.85		26	0.0121	0.0003	3.0	27.8	87.6	•
8/26/93	76.15	90	1	0.0795	0.0003	4.0	9.0	•	81.7
8/26/93	87.45	96	4	0.0219	0.0004	4.0	1.9	•	82.1
<b>GSB-910</b>									
9/8/93	40.25	22	5	0.0023	0.0003	3.0	27.6	•	102.0
9/8/93	40.50	22	6	0.0042	0.0004	3.0	16.8	•	92.3
9/8/93	40.75	22	7	0.0022	0.0003	3.0	43.5	•	92.8
9/8/93	77.40	37	1	0.0093	0.0004	24.0	12.2	•	48.5
9/9/93	86.00	75	7	0.0188	0.0004	24.0	14.9	84.1	•
<b>TEP-GP-106</b>									
9/15/93	108.00	98	7	0.0147	0.0003	5.0	•	55.6§	37.5§
<b>TEP-GP-105</b>									
9/22/93	41.50	44	1	0.0055	0.0003	3.0	68.2	95.5	•
9/22/93	41.75	44	1	0.0063	0.0003	3.0	28.4	99.3	•
9/22/93	42.00	44	2	0.0035	0.0003	2.5	64.0	87.6	•

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**Appendix H. BTD results. (Continued).**

Date Sampled	Bore Depth Feet	Sample Temp.* °C	Holding Time Days	TPH** mg/kg	LOD mg/kg	Analysis Time Hours	Field Spike*** % Recovery	Core Spike**** % Recovery	Lab Spike***** % Recovery
9/22/93	42.25	44	2	0.0050	0.0003	3.0	65.0	96.0	•
9/22/93	43.50	44	5	0.0048	0.0003	3.0	24.0	79.2	•
9/22/93	61.00	82	12	0.0096	0.0003	3.0	14.0	80.5	•
9/22/93	61.25	82	13	0.0060	0.0004	3.0	15.4	96.9	•
9/22/93	61.75	82	16	0.0126	0.0003	23.0	12.4	96.5	•
9/22/93	64.50	82	7	0.0060	0.0003	3.0	64.8	98.7	•
9/22/93	65.25	82	8	0.0065	0.0004	3.0	3.7	94.9	•
9/22/93	66.55	82	6	0.0071	0.0003	3.0	92.1	95.8	•
9/22/93	66.80	82	5	0.0046	0.0004	3.0	39.4	92.7	•
9/22/93	67.05	82	6	0.0099	0.0004	3.0	97.6	96.7	•

Note: • Indicates analysis not performed.

\*Sample temperatures are for closest measured depth.

\*\* Total Petroleum Hydrocarbons (Window: C6 to C12).

\*\*\* Field Spike injected into core (TCE for HW-GP-103, Chlorobenzene for all others).

\*\*\*\* Core spike injected into core in the laboratory (Chlorobenzene for HW-GP-103 (TCE for 51.40 ft.), TCE for all others).

\*\*\*\*\* Lab spike injected into chamber through septum port (Chlorobenzene for HW-GP-103, TCE for all others).

§Core heated to 90 °C before addition of Lab and Core spikes.